Florida Additive Rule for Septic System Products: Effluent of Biofilters Containing Clinoptilolite, Elemental Sulfur and Lignocellulosic Media

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Executive Summary

Experiments were performed to evaluate clinoptilolite, elemental sulfur and lignocellulosic material (*Southern Yellow Pine*) according to *Florida's Additive Rule For Septic System Products* established by the Florida Department of Health (FDoH). Each material is a candidate media for biofilters that enhance nitrogen removal in onsite wastewater treatment systems. Clinoptilolite is a candidate for aerobic biofilters, while elemental sulfur and lignocellulosic materials are intended as media in anoxic denitrifying biofilters. Additives testing was conducted by performing chemical analyses and acute toxicity bioassays on effluent samples from five biofilters that were actively operating at the Passive Nitrogen Removal Study (PNRS) pilot facility. The test media components of the five biofilters were: clinoptilolite only, elemental sulfur only, lignocellulosic only, lignocellulosic and elemental sulfur, and clinoptilolite, lignocellulosic and elemental sulfur. Volatile organic compound (VOC) analyses were conducted using E.P.A. Methods 8260 and 8011, and acute toxicity testing was performed by ninety-six hour bioassay with *Cyprinella leedsi* (Bannerfin Shiner) according to the E.P.A. Whole Effluent Toxicity (WET) protocol.

The concentrations of VOCs in all five biofilter effluents were below Method Detection Limits for the majority of chemicals. Only two out of three hundred and thirty five analytical results exceeded the Guidance Maximum Contaminant Level (GMCL) for VOCs established by the Florida Department of Health. The sole chemical exceeding its GMCL was p-Cymene (4-Isopropyltoluene), which was found only in the effluent of the biofilters that contained fresh and recently added lignocellulose media. P-Cymene is a natural product of lignocellulose biodegradation that is purported be relatively stable under anoxic conditions, such as would occur in saturated denitrifying biofilters in which lignicellulosic media would be deployed. The release of P-Cymene from lignocellulosic media might also decline substantially over time. P-Cymene would be expected to be readily biodegraded under the aerobic conditions which would likely characterize the receiving environments to which anoxic biofilter effluents would be directed.

Four of the five biofilter effluents did not exhibit toxicity by the WET protocol, as exhibited by Lethal Concentration 50 (LC50) of greater than 100%. The four biofilters with no effluent toxicity included the following test media: clinoptilolite only, elemental sulfur only, lignocellulosic only, and clinoptilolite, lignocellulosic and elemental sulfur. Each of the three test media, used singly or in combination, did not result in effluent toxicity according to the WET protocol. Only In Situ 1 effluent exhibited effluent toxicity, with an LC50 of 15.6%. The In Situ 1 the test media, however, did not exhibit effluent toxicity when used in other biofilters. Analyses of biofilter effluent data indicated that, when samples were collected for bioassay testing, the ammonia concentration was likely to have been significantly higher in In Situ 1 effluent compared to all other biofilter effluents. The elevation in pH during the bioassay test suggested that unionized ammonia was the cause of toxicity of In Situ 1 effluent. The analysis suggested that In Situ 1 effluent toxicity was caused not by the release of toxic constituents from the added test media, but rather by the process related issue of less than complete ammonia removal during a period of nitrification establishment with the In Situ 1 biofilter.

Background

Florida's Additive Rule for Septic System Products The Florida Deparrtment of Health has established specific testing and evaluation requirements for materials that are added to onsite wastewater systems in Florida (FDoH, 2010). Chapter 381.0065 (4) (m), Florida Statutes states: " No product sold in the state for use in onsite sewage treatment and disposal systems may contain any substance in concentrations or amounts that would interfere with or prevent the successful operation of such system, or that would cause discharges from such system to violate applicable water quality standards." The additives rule testing requirements generally include evaluation of volatile organic chemicals by U.S. E.P.A. Method 8260 and acute toxicity bioassay testing by the E.P.A. Whole Effluent Toxicity 96 hr. bioassay protocol (FDoH, 2010).

Test Media Three materials were evaluated: clinoptilolite, lignocellulosic material and elemental sulfur.

- Clinoptilolite is a hydrous sodium aluminosilicate, a natural zeolite consisting of a microporous arrangement of silica and alumina tetrahedra (Mumpton, 1999). Natural zeolites are usually formed from alteration of glass-rich volcanic rocks (called tuffs) deposited in saline playa lakes. Clinoptilolite is made up of three-dimensional cage-like framework of silica (SiO_4) and alumina (AlO_4) molecules. The Silicon (Si^{+4}) and Aluminum (Al^{+3}) atoms are linked together through shared Oxygen (O^{-2}) atoms to form a cage-like framework. The major chemical components of clinoptilolite ZS403H are SiO_2 (69.1%) and Al_2O_3 (11.9%). ZS403H has a typical ion exchange capacity of 1.85 milliequivalents/ gram and numerous exchangeable cations including ammonium ion (GSA Resources Inc., 2011). When supplied in granular form, ZS403H has an intrinsic density of 100 lbs./ft^3. Zeolites have three key properties that make them excellent candidates for onsite wastewater treatment biofilters. They provide an excellent attachment surface for nitrifying microorganisms, ion exchange capacity for ammonium ion, and a high water retention. A number of studies have addressed the use of clinoptilolite and other natural zeolites for water, wastewater and stormwater treatment in various process configurations (Beler-Baykal, 1998; Beler-Baykal, B.; Guven, D.,1997; Bertrand-Krajewski, J. et al., -L.,1997; Celik, at al. 2001; Chang et al., 2009; Cooney et al., 1999; Demir et al., 2002; Fernández et al., 2007; Green et al., 1996; He et al., 2007; Ji et al., 2010; Jung et al., 2004; Karadag et al., 2006; Lahav and Green, 1998; Lahav and Green, 2000; Miladinovic and Weatherley, 2008; Milán et al., 2001; Montalvo et al., 2005; Njoroge and Mwamachi, 2004; Oldenburg and Sekoulov, 1995; Park et al., 2002; Smith, 2006; Smith, 2011; Wang and Peng, 2010; Wu et al., 2008; Zhang and Perschbacher, 2003). Recently, clinoptilolite was shown to be highly effective as an unsaturated biofilter media for onsite wastewater treatment (Smith, 2009).

- Lignocellulosic material is a structural component of woody plants and one of the most abundant biopolymers on earth. It is composed primarily composed of cellulose, hemicellulose and lignin. Cellulose is an organic compound with molecular formula $(C_6H_{10}O_5)_n$, a polysaccharide consisting of a linear chain of several hundred to over ten thousand $\beta(1\rightarrow4)$ linked D-glucose units. Hemicellulose is a polysaccharide related to cellulose that comprises ca. 20% of the biomass of most plants. Hemicellulose, in

contrast to cellulose, is derived from several sugars in addition to glucose, especially xylose. Lignin is a complex chemical and an integral part of the secondary cell walls of woody plants (Lebo et al.,2001). Lignin is one of the most abundant organic polymers on Earth, exceeded only by cellulose, and constitutes from a quarter to a third of the dry mass of wood. As a biopolymer, lignin is unusual because of its heterogeneity and lack of a defined primary structure. Lignin is a cross-linked macromolecule composed of three types of substituted phenols (phenylpropanes) having guaiacyl, syringyl p-hydroxyphenyl and biphenyl nuclei, linked and polymerized through a variety of nonhydroxyl stable C-C and C-O-C bonds (Paul, and Clark, 1989). Its structure is based on the phenyl propanoid unit, which consists of an aromatic ring and 3-C side chain. Lignin fills the spaces in the cell wall between cellulose, hemicellulose, and pectin and is covalently linked to hemicellulose; it resembles a kind of phenolformaldehyde resin that acts like glue to hold the lignocellulose matrix together. The most commonly noted lignin function is the support through strengthening of wood (xylem cells) in trees (Wardrop, 1969). Lignin is generally associated with reduced digestibility of the overall plant biomass, which helps defend against pathogens and pests. As part of natural cycling, lignin degradation is facilitated by microorganisms including fungi and bacteria although the details of biodegradation are not well understood. Organic products of lignin degradation can be further processed by bacteria.

Southern Yellow Pine (SYP) is a collective term that refers to a group of coniferous species which are classified as yellow pine (as opposed to white pine) and which are native to the Southern United States. Pines are a common feature of the Florida landscape. There are seven species of pines that are native to Florida three other commonly planted non-native species (Amy and Flinchum, (2011). They grow very well in the acidic red clay soil found in most of the region. The varieties principally include Longleaf *(Pinus palustris)*, Loblolly *(Pinus taeda)*, Shortleaf *(Pinus echinata)*, and Slash *(Pinus elliotti)* pine (Forest Products Laboratory, 1936). There are generally no fundamental differences among southern pines for lumber production and Longleaf and Slash pines have historically been responsible for 60% of the world's turpentine supply.

The use of lignocellulosic material has been generally recognized as a viable approach to engineered denitrification (Schipper et al., 2010a; Collins et al., 2010). Successful application of lignocellulosic materials as electron donor in passive denitrification systems has been reported in many studies (Cameron and Schipper, 2010; Elgood et al., 2010; Moorman et al., 2010; Oakley et al. 2010; Schipper et al., 2010b; Woli et al., 2010). Several studies have successfully applied pine based lignocellulosics in denitrification biofilters (Cameron and Schipper, 2010; Elgood et al., 2010; Robertson, 2010; Schipper et al., 2010c).

- Elemental sulfur is a non-metallic element on the periodic chart, with an atomic number of 16 and atomic weight of 32.065. It is known as Brimstone in its natural state. It is insoluble in water, tasteless and odorless, and often occurs as a light yellow solid. Sulfur is distributed widely over the earth's surface and occurs in both combined and free states. A significant amount of the world's supply of sulfur for human uses formerly came from sulfur-bearing limestone deposits found in the Gulf Coast region of North America.

Currently, elemental sulfur is produced primarily through its recovery from the hydrogen sulfide(H_2S) in "sour" natural gas and by refining of petroleum (Claus process).

The rhombic structure is the most commonly found sulfur form and consists of eight sulfur atoms (S_8) arranged in a puckered-ring structure. Rhombic elemental sulfur has a molecular weight of 256.50 Da, a specific gravity of 2.07 at 70^{o}F. The rhombic structure is the stable crystalline form at one atmosphere pressure and temperature less than 95.4ºC, while the monoclinic crystalline structure is thermodynamically dominant from 95.4ºC up to the melt temperature of 118.9ºC. Elemental sulfur is not readily wetted or dissolved by water.

Numerous studies have addressed the use of elemental sulfur for denitrification in laboratory and field studies in a variety of biofilter configurations (Air et al., (2005); Bachelor et al., 1978; Busoni et al., 1977; Darby et al., 2003b; Darby et al., 2002; Darby et al., 2003a; Flare and Zhang, 1998; Urumqi et al., 1996; Hasegawa and Hamachi 2001; Hwang et al., 2005; Kantar et al., 1998; Kim et al., 2004; Kim and Bee, 2000; Kim et al., 2003; Koenig and Liu, 2002; Koenig and Liu, 2004; Koenig et al., 2005; Kauai and Verstraete, 1999; Lampe and Zhang, 1996; Li et al., 2009; Moon et al., 2004; Moon et al., 2006; Moon et al., 2008; Nugroho et al., 2002; Oh et al., 2002; Oh et al., 2001; Park et al., 2002; Shan and Zhang, 1998; Sierra-Alvarez et al., 2007; Soares, 2002; Tanaka et al., 2007; Wang et al., 2005; Yamamoto-Ikemoto and Komori, 2003; Zeng and Zhang, 2005; Zhang, 2002; Zhang, 2004; Zhang and Lampe, 1999; Zhang and Shan, 1999). Recently, elemental sulfur was shown to be highly effective in supporting onsite wastewater denitrification in saturated anoxic biofilters (Smith, 2009).

Known and Expected Reactions Clinoptilolite exhibits ion exchange for cations and is therefore expected to exhibit substantial retention of ammonium ions through adsorption processes. It also serves as a support media for microorganisms that catalyze many types of biochemical reactions without necessarily participating directly in them. Lignocellulosic media is expected to degrade when through hydrolytic reactions which may be enhanced by microbial processes, thereby releasing organic carbon which may undergo possible subsequent reactions to produce labile organic carbon compounds that can be used by heterotrophic denitrifying microorganisms. Elemental sulfur is expected to undergo oxidative dissolution catalyzed by autotrophic microbial processes when external electron donors are present, including molecular oxygen, nitrate, and nitrite.

Anticipated Use Clinoptilolite will be employed, alone or with other media, in vertical flow, unsaturated biofilters which support nitrification and oxidation of organic matter in wastewater. Unsaturated conditions in clinoptilolite biofilters enable passive ingress of oxygen from the atmosphere to support aerobic biochemical reactions. Lignocellulosic material and elemental sulfur, alone or with other media, will be employed in fully or partially saturated biofilters or biofilter layers to affect denitrification. Biofilter configurations include vertical upflow, vertical downflow, horizontal flow, and as layered strata located beneath vertical unsaturated media.

Experimental Methods

Additives Clinoptilolite was purchased from GSA Resources, Inc., Tuscon, AZ, in 8x14 and 16x50 size gradations, which were used directly in the biofilters. The clinoptilolite was ZK403H with a bulk density of approximately 55 lbs./ft^3 and a Cation Exchange Capacity of 1.85 milliequivalents per gram. A Material Safety Data Sheet (MSDS) for ZK403H is included in Appendix A. Lignocellulosic material was procured in January, 2011 from lumber cutting operations at Suwanee Lumber Co., Cross City, FL. The material was residuals (sawdust and shavings) from the internal sections of Southern Yellow Pine and did not include bark components. Elemental sulfur was procured from two sources. Granular elemental sulfur (Code 420) was procured from Georgia Gulf Sulfur Corporation, Valdosta, GA and has a minimum elemental sulfur content of 99.5%. A Material Safety Data Sheet (MSDS) for granular sulfur is included in Appendix C. Pastille elemental sulfur was supplied by CoreAgri, Arroya Grande, CA. The ES99 material has a bulk density of 76 lbs./ft^3 and a minimum elemental sulfur content of 99.5%. The MSDS for ES99 pastille sulfur is included in Appendix C.

Biofilter Configuration and Sample Collection The effluents were collected from five actively operating biofilters at the Passive Nitrogen Removal Study pilot plant (Hazen & Sawyer, 2009). A sample of primary effluent (influent to the pilot plant) was also collected for chemical analysis. Biofilter characteristics are listed in Table 1. Each candidate media was the sole test media in three biofilters: Unsat CL4, Denit LS1 and Denit SU1. In Situ 1 contained lignocellulosic media and elemental sulfur, while In Situ 3 contained all three test media. The clinoptilolite biofilter (Unsat CL4) and horizontal elemental sulfur biofilter (Denit SU1) had been operating in their tested configuration for approximately fourty weeks when samples were collected for additives testing. The operation of lignocellusic containing biofilters (Denit LS1, In Situ 1, In Situ 3) in a revised configuration was initiated on 1/31/2011 and they had been operating for sixteen days when additives test sampling was initiated. Sampling was conducted from 2/15/2011 to 2/17/2011 for the In Situ 3 bioassay test and on 2/17/2011 for all other bioassay and chemical tests. Resampling was conducted on 3/1/2011 for E.P.A. Method 8060 analyses due to a smaple preservation issue. Effluent samples were collected in polyethylene containers which were stored on ice during sample collection where extended times periods were required to collect required sample volume. Samples were then subdivided into specific sample containers for chemical and bioassay analysis, immediately palced in coolers on ice, and transported directly to laboratories in Tampa and Sarasota, FL. As a part of the Passive Nitrogen Removal Study, a water quality monitoring event was conducted on 3/17/2011. The water quality data (Table 2) represents conditions approximately twenty eight days after the bioassay samples were collected, but can be used to provide insight into of biofilter perfomance when the effluent samples were collected for the Additives Testing. One notable water quality result is the high ammonia concentration in the effluent of biofilter In Situ 1. Elevated ammonia levels can result in toxicity in the Whole Effluent Toxicity procedure when tested effluents would not otherwise be toxic (Author, personal experience).

Chemical Analyses Chemcial analyses were conducted by Pace Analytical Laboratory, Inc., 8 East Tower Circle, Ormond Beach, Florida. Pace Analytical Laboratory, Inc. is NELAP accredited through the Florida Department of Health. *Florida's Additive Rule For Septic System Products* specifies that E.P.A. Method 8260 be used to analyze for volatile organic chemicals.

The organic chemicals quantified by Method 8260 are listed in Table 3 along with Guidance Maximum Contaminant Levels (MCLs) established by FDoH and Method Detection Limits (MDLs). E.P.A. Method 8111 was additionally employed to achieve lower MDLs two chemicals listed in Table 4. Analytical MDLs were less than the FDoH Guidance Maximum Contaminant Levels (MCLs) for all chemicals.

Table 1. Biofilter Configuration

System	Influent	Operational Hydraulic Loading Rate (gal/ft^2-day)	Media Depth and Composition			Saturated or Unsaturated
			Total Depth, in.	Layer Depth, in.	Composition	
Unsat CL4	Septic Tank Effluent	12.0[1]	30	30	100% clinoptilolite (10 in. 1.4-2.38 mm (upper); 20 in. 0.3-1.2 mm (lower)	Unsaturated
Denit LS1	Stage 1 Effluent[2]	10.0	72	72	50% lignocellulosic (1-5mm) 50% expanded clay (1.13-3 mm)	Saturated
Denit SU1	Stage 1 Effluent[2]	10.0	72	72	80% elemental sulfur granular (1.13-3mm) 20% oyster shell (1.13-2 mm)	Saturated
IN SITU 1	Septic Tank Effluent	0.8	30	4	100% torpedo sand (0.4-2mm)	Unsaturated
				8	100% filter sand	Unsaturated
				12	40% lignocellulosic (1-5mm) 60% expanded clay (1.53-3 mm)	Unsaturated
				2	100% pea gravel	Saturated
				4	100% elemental sulfur pastille (2-5 mm)	Saturated
IN SITU 3	Septic Tank Effluent	1.2	30	4	100% clinoptilolite (1.4-2.38 mm)	Unsaturated
				8	100% clinoptilolite (0.3-1.2 mm)	Unsaturated
				12	40% lignocellulosic (1-5mm) 60% expanded clay (1.53-3 mm)	Unsaturated
				2	100% pea gravel	Saturated
				4	100% elemental sulfur pastille (2-5 mm)	Saturated

[1] 3.0 gal/ft^2-day septic tank effluent and 9.0 gal/ft^2-day recycle
[2] Combined Stage 1 effluent from UNSAT-SA2, UNSAT-EC4, UNSAT-CL2 and UNSAT CL-4

Table 2. Biofilter Effluent Water Quality

Parameter	Effluent					
	Primary (septic tank)	Unsat CL4	Denit LS1	Denit SU1	InSitu 1	InSitu 3
Temperature, ^{o}C	21.4	12.2	4.6	7.2	10.7	6.2
Dissolved oxygen, mg/L	2.8	7.4	< 0.1	< 0.1	-	-
Specific conductance, umhos/cm	1099	860	886	1254	999	1269
pH	7.5	8.2	7.4	7.0	7.3	7.6
Total alkalinity, mg/L as $CaCO_3$	400	110	320	250	400	500
Total suspended solids, mg/L	110	< 1	20	2	2	2
Carbonaceous five day biochemical oxygen demand, mg/L	93	< 2	150	< 2	120	< 2
Chemical oxygen demand, mg/L	380	16	320	45	240	120
Total nitrogen, mg/L	78	36	1.8	2.2	9.0	9.2
Total kjeldahl nitrogen, mg/L	78	2.7	1.8	2.1	8.9	3.2
Organic nitrogen, mg/L	13	2.7	1.2	0.4	0.2	3.0
Ammonia nitrogen, mg/L[1]	65	0.006	0.61	1.7	8.7	0.20
Nitrate nitrogen, mg/L	0.05	33	0.01	0.05	0.05	5.8
Nitrite nitrogen, mg/L	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.23
Sulfate, mg/L	38	-	-	380	20	98
Sulfide	5.2	-	-	-	-	-
Hydrogen sulfide, unionized, mg/L	1.2	-	-	-	-	-
Total phosphorus, mg/L	13	-	-	-	-	-
Orthophosphate phosphorus, mg/L	-	4.9	2.0	2.9	5.2	3.5

- not analyzed
[1] NH_4^+-N + NH_3-N

Table 3. Guidance MCLs and Method Detection Limits for E.P.A. 8260 Parameters

Chemical Parameter (EPA 8260)	CAS #	FDoH VOC Guidance MCL, ug/L[1]	MDL, ug/L
1,1,1,2-Tetrachloroethane	630-20-6	1	0.5
1,1,1-Trichloroethane	71-55-6	200	0.5
1,1,2,2-Tetrachloroethane	79-34-5	0.2	0.18
1,1,2-Trichloroethane	79-00-5	5	0.5
1,1-Dichloroethane	75-34-3	700	0.5
1,1-Dichloroethene (Vinylidene Chloride)	75-35-4	7	0.5
1,1-Dichloropropene	563-58-6	1	0.5
1,2,3-Trichlorobenzene	87-61-6	70	0.5
1,2,3-Trichloropropane	96-18-4	42	0.36
1,2,4-Trichlorobenzene	120-82-1	70	0.5
1,2,4-Trimethylbenzene	95-63-6	10	0.5
1,2-Dibromo-3-chloropropane (DBCP)	96-12-8	0.2	1
1,2-Dibromoethane (EDB,Ethylene dibromide)	106-93-4	0.02	0.5
1,2-Dichlorobenzene (o-Dichlorobenzene)	95-50-1	600	0.5
1,2-Dichloroethane (Ethylene dichloride)	107-06-2	3	0.5
1,2-Dichloropropane	78-87-5	5	0.5
1,3,5-Trimethylbenzene	108-67-8	10	0.5
1,3-Dichlorobenzene (m-Dichlorobenzene)	541-73-1	10	0.5
1,2-Dichloropropane	78-87-5	5	0.5
1,4-Dichlorobenzene (p-Dichlorobenzene)	106-46-7	75	0.5
2,2-Dichloropropane	594-20-7	5	0.5
2-Butanone (Methyl ethyl ketone) (MEK)	78-93-3	4200	5
2-Chloroethyl Vinyl Ether	110-75-8	1	0.5
o-Chlorotoluene	95-49-8	140	0.5
Hexachlorobutadiene	87-68-3	15	0.5
p-Chlorotoluene	106-43-4	140	0.5
4-Isopropyltoluene (p-Cymene)	99-87-6	70	0.5
4-Methyl-2-pentanone (Methyl isobutyl ketone) [MIBK]	108-10-1	350	5
Acetone	67-64-1	700	5
Benzene	71-43-2	1	0.5
Bromobenzene	108-86-1		0.5
Bromochloromethane	74-97-5	91	0.5
Bromodichloromethane	75-27-4	0.6	0.27
Bromoform	75-25-2	4	0.5
Bromomethane (Methyl bromide)	74-83-9	9.8	0.5
Carbon disulfide	75-15-0	700	0.5
Carbon Tetrachloride (Tetrachloromethane)	56-23-5	3	0.5
Chlorobenzene	108-90-7	100	0.5
Chloroethane (Ethyl chloride)	75-00-3	12	0.5
Chloroform	67-66-3	70	0.5
Chloromethane (Methyl chloride)	74-87-3	2.7	0.62
cis-1,2-Dichloroethene	156-59-2	70	0.5
cis-1,3-Dichloropropene (DCP, Telone)	10061-02-5	1	0.25
Dibromochloromethane	124-48-1	0.4	0.26
Dibromomethane	74-95-3		0.5
Dichlorodifluoromethane (CFC 12)	75-71-8	1400	0.5
Ethylbenzene	100-41-4	30	0.5
Hexachlorobutadiene	87-68-3	0.5	0.5
Isopropylbenzene (Cumene)	98-82-8	0.8	0.5
m,p-Xylenes	1330-20-7	20	0.5
Methylene Chloride (Dichloromethane)	75-09-2	5	2.5
Methyl-tert-Butyl-Ether (MTBE)	1634-04-4	20	0.5
Naphthalene	91-20-3	14	0.5
n-Butyl Benzene	104-51-8	280	0.5
n-Propyl Benzene	103-65-1	280	0.5
o-Xylene	95-47-6	20	0.5
sec-Butylbenzene	135-98-8	280	0.5
Styrene (Vinyl benzene)	100-42-5	100	0.5
tert-Butylbenzene	98-06-6	280	0.5
Tetrachloroethene	127-18-4	3	0.5
Toluene	108-88-3	40	0.5
trans-1,2-Dichloroethene	156-60-5	100	0.5
trans-1,3-Dichloropropene	10061-01-5	0.4	0.25
Trichloroethene (TCE)	79-01-6	3	0.5
Trichlorofluoromethane (CFC 11)	75-69-4	2100	0.5
Vinyl chloride	75-01-4	1	0.5
Xylenes (Total)	1330-20-07	20	0.5

[1] Provided by Sonia Cruz, FDoH

Table 4. Guidance MCLs and Method Detection Limits for E.P.A. 8011 Parameters

Constituent #	Chemical Parameter (EPA 8011)	CAS #	FDoH VOC Guidance MCL, ug/L[1]	MDL, ug/L
12	1,2-Dibromo-3-chloropropane (DBCP)	96-12-8	0.2	0.0048 - 0.0050
13	1,2-Dibromoethane (EDB,Ethylene dibromide)	106-93-4	0.02	0.0061 - 0.0063

[1] Provided by Sonia Cruz, FDoH

Acute Toxicity Bioassays
Acute toxicity bioassays were conducted by Marinco Bioassay Laboratory, Inc., 4569 Samual Street, Sarasota, Florida. Marinco Bioassay Laboratory, Inc. is NELAP accredited through the Florida Department of Health. The bioassay tests followed standard protocols for whole effluent toxicity testing (U.S. Environmental Protection Agency, 2002). Ten day old *Cyprinella leedsi* (Bannerfin Shiner) were the sensitive test organisms used in the bioassays (Figure 3).

Figure 1. ***Cyprinella leedsi***

Results and Discussion

Chemical Analyses The concentrations of VOCs in all five biofilter effluents are shown in Table 5. VOCs were below Method Detection Limits for the majority of chemicals. Of the three hundred and thirty five VOC analytical results reported for the five biofilter effluents, only two exceeded the Guidance Maximum Contaminant Level (GMCL) for VOCs established by the Florida Department of Health. The sole chemical exceeding its GMCL was p-Cymene (4-Isopropyltoluene), which was found only in the effluent of the biofilters that contained fresh lignocellulose media that had been added to the biofilters approximately four weeks before sample collection. P-Cymene was not detected in the effluents of biofilters with tests media of clinoptilolite only and sulfur only.

P-cymene originates from terpenes, which are a varied and large class of organic compounds produced by a wide variety of plants and conifers in particular. Terpenes are the major component of resin and major biosynthetic building blocks in nearly every form of life (e.g. Vitamin A). Monoterpenes also occur naturally in animals. P-Cymene ($C_{10}H_{14}$), with molecular weight of 143.22 Da, is an aromatic isoprenoid and a natural monoterpenoid product derived from chemical modification of monoterpene constituents. P-Cymene is found in over one hundred plants, is a constituent of a number of essential oils,

most commonly the oil of cumin and thyme, and is reported to have disinfectant properties (Haneke, 2002). It has low water solubility.

The presence of p-Cymene in effluents from lignocellulosic-containing biofilters suggests that it was produced by microbial and enzymatic degradation processes acting on the lignocellulosic media within the biologically active biofilter environment. P-Cymene is purported be relatively stable under anoxic conditions, such as would occur in the saturated denitrifying biofilters in which lignicellulosic media would be deployed (Howard, 1991). However, p-Cymene would be expected to be readily biodegraded under the aerobic conditions which would likely characterize the receiving environments to which anoxic biofilter effluents would be directed (Howard, 1991). Aerobic catabolic pathways of p-cymene biodegradation have been well elucidated. P-Cymene undergoes transformation to p-cumic alcohol according to metabolic reaction: *p*-cymene + NADH + oxygen + H^+ = *p*-cumic alcohol + NAD^+ + H_2O. This is only the first step in multi-enzyme transformation pathways. The *p*-cumic alcohol can then be further catabolized to isobutyrate, pyruvate, and acetyl-CoA. Several strains of *Pseudomonas putida,* including *Pseudomonas putida* F1 , PL, and KL47, have been documented to utilize *p*-cymene for growth by means of a catabolic pathway that first converts it first to *p*-cumate , then continues via 2-oxopentenoate , and overall yields isobutyrate, pyruvate and acetyl-CoA (Madhyastha and Bhattacharyya, 1968; Madhyastha et al., 1968). The later metabolites are common biochemical intermediates in aerobic and anaerobic pathways.

P-Cymene would be expected to be readily biodegraded under the aerobic conditions which would likely characterize the receiving environments to which anoxic biofilter effluents would be directed (Howard, 1991). The results of this additives testing suggest that in situ p-Cymene degradation processes may be operative. P-Cymene concentrations in the In Situ 1 and in Situ 3 biofilter effluents were much lower than in the effluent of fully saturated Denit LS1. Whereas the lignocellulosic media in Denit LS1 is ostensibly fully anoxic (past the initial entrance region), the lignocellulosic media In Situ 1 and in Situ 3 was deployed in unsaturated media layers which would likely permit some degree of oxygen ingress. Lower p-Cymene the In Situ1 and in Situ 3 biofilters suggests that aerobic conditions may substantially limit p-Cymene effluent levels in biofilters as well as in receiving zones with some degree of oxygenation. The release of P-Cymene from lignocellulosic media might also decline substantially over time as the initially high rate of release of labile organic matter declined.

Table 5. Effluent Analyte Concentrations and FDoH Guidance Levels

Chemical Parameter	CAS #	FDoH Guidance MCL, ug/L[1]	Effluent Concentration (ug/L)					
			Septic Tank	Unsat CL4	Denit LS1	Denit SU1	InSitu 1	InSitu 3
1,1,1,2-Tetrachloroethane	630-20-6	1	U	U	U	U	U	U
1,1,1-Trichloroethane	71-55-6	200	U	U	U	U	U	U
1,1,2,2-Tetrachloroethane	79-34-5	0.2	U	U	U	U	U	U
1,1,2-Trichloroethane	79-00-5	5	U	U	U	U	U	U
1,1-Dichloroethane	75-34-3	700	U	U	U	U	U	U
1,1-Dichloroethene (Vinylidene Chloride)	75-35-4	7	U	U	U	U	U	U
1,1-Dichloropropene	563-58-6	1	U	U	U	U	U	U
1,2,3-Trichlorobenzene	87-61-6	70	U	U	U	U	U	U
1,2,3-Trichloropropane	96-18-4	42	U	U	U	U	U	U
1,2,4-Trichlorobenzene	120-82-1	70	U	U	U	U	U	U
1,2,4-Trimethylbenzene	95-63-6	10	U	U	U	U	U	U
1,2-Dibromo-3-chloropropane (DBCP)	96-12-8	0.2	U	U	U	U	U	U
1,2-Dibromoethane (EDB,Ethylene dibromide)	106-93-4	0.02	U	U	U	U	U	U
1,2-Dichlorobenzene (o-Dichlorobenzene)	95-50-1	600	U	U	U	U	U	U
1,2-Dichloroethane (Ethylene dichloride)	107-06-2	3	U	U	U	U	U	U
1,2-Dichloropropane	78-87-5	5	U	U	U	U	U	U
1,3,5-Trimethylbenzene	108-67-8	10	U	U	U	U	U	U
1,3-Dichlorobenzene (m-Dichlorobenzene)	541-73-1	10	U	U	U	U	U	U
1,2-Dichloropropane	78-87-5	5	U	U	U	U	U	U
1,4-Dichlorobenzene (p-Dichlorobenzene)	106-46-7	75	U	U	U	U	U	U
2,2-Dichloropropane	594-20-7	5	U	U	U	U	U	U
2-Butanone (Methyl ethyl ketone) (MEK)	78-93-3	4200	7.8 (I)	U	17.3	6.1 (I)	U	30.9
2-Chloroethyl Vinyl Ether	110-75-8	1	U	U	U	U	U	U
o-Chlorotoluene	95-49-8	140	U	U	U	U	U	U
Hexachlorobutadiene	87-68-3	15	U	U	U	U	U	U
p-Chlorotoluene	106-43-4	140	U	U	U	U	U	U
4-Isopropyltoluene (p-Cymene)	99-87-6	70	0.62 (I)	U	**1,380**	U	**202**	13.3
4-Methyl-2-pentanone (Methyl isobutyl ketone)	108-10-1	350	U	U	U	U	U	U
Acetone	67-64-1	700	255	U	30.2	7.6 (I)	U	46.7
Benzene	71-43-2	1	U	U	U	U	U	U
Bromobenzene	108-86-1		U	U	U	U	U	U
Bromochloromethane	74-97-5	91	U	U	U	U	U	U
Bromodichloromethane	75-27-4	0.6	U	U	U	U	U	U
Bromoform	75-25-2	4	U	U	U	U	U	U
Bromomethane (Methyl bromide)	74-83-9	9.8	U	U	U	U	U	U
Carbon disulfide	75-15-0	700	3.1	0.72 (I)	0.92 (I)	1.5	U	U
Carbon Tetrachloride (Tetrachloromethane)	56-23-5	3	U	U	U	U	U	U
Chlorobenzene	108-90-7	100	U	U	U	U	U	U
Chloroethane (Ethyl chloride)	75-00-3	12	U	U	U	U	U	U
Chloroform	67-66-3	70	U	U	U	U	U	U
Chloromethane (Methyl chloride)	74-87-3	2.7	U	U	U	U	U	U
cis-1,2-Dichloroethene	156-59-2	70	U	U	U	U	U	U
cis-1,3-Dichloropropene (DCP, Telone)	10061-02-5	1	U	U	U	U	U	U
Dibromochloromethane	124-48-1	0.4	U	U	U	U	U	U
Dibromomethane	74-95-3		U	U	U	U	U	U
Dichlorodifluoromethane (CFC 12)	75-71-8	1400	U	U	U	U	U	U
Ethylbenzene	100-41-4	30	U	U	0.67(I)	U	U	U
Hexachlorobutadiene	87-68-3	0.5	U	U	U	U	U	U
Isopropylbenzene (Cumene)	98-82-8	0.8	U	U	U	U	U	U
m,p-Xylenes	1330-20-7	20	U	U	U	U	U	U
Methylene Chloride (Dichloromethane)	75-09-2	5	U	U	U	U	U	U
Methyl-tert-Butyl-Ether (MTBE)	1634-04-4	20	U	U	U	U	U	U
Naphthalene	91-20-3	14	U	U	U	U	U	U
n-Butyl Benzene	104-51-8	280	U	U	U	U	U	U
n-Propyl Benzene	103-65-1	280	U	U	U	U	U	U
o-Xylene	95-47-6	20	U	U	U	U	U	U
sec-Butylbenzene	135-98-8	280	U	U	44.3	U	U	U
Styrene (Vinyl benzene)	100-42-5	100	U	U	U	U	U	U
tert-Butylbenzene	98-06-6	280	U	U	U	U	U	U
Tetrachloroethene	127-18-4	3	U	U	U	U	U	U
Toluene	108-88-3	40	**40.5**	U	0.57 (I)	U	1.1	U
trans-1,2-Dichloroethene	156-60-5	100	U	U	U	U	U	U
trans-1,3-Dichloropropene	10061-01-5	0.4	U	U	U	U	U	U
Trichloroethene (TCE)	79-01-6	3	U	U	U	U	U	U
Trichlorofluoromethane (CFC 11)	75-69-4	2100	U	U	U	U	U	U
Vinyl chloride	75-01-4	1	U	U	U	U	U	U
Xylenes (Total)	1330-20-07	20	U	U	0.80 (I)	U	U	U

[1]Provided by Sonia Cruz, FDoH

U not detected

I detected below Practical Quantitation Level

Acute Toxicity Bioassays Results of acute bioassay testing with *Cyprinella leedsi* are summarized in Table 6. A full laboratory report of acute bioassay testing is included in Appendix E. Four of the five biofilter effluents did not exhibit toxicity by the WET protocol, as exhibited by Lethal Concentration 50 (LC50) of greater than 100%. The four biofilters with no effluent toxicity included the following test media:

- clinoptilolite only
- elemental sulfur only
- lignocellulosic only
- clinoptilolite, lignocellulosic and elemental sulfur.

Therefore, each of the three test media, used singly or in combination, did not result in effluent toxicity according to the WET protocol.

The only biofilter to exhibit effluent toxicity was In Situ 1 effluent, with an LC50 of 15.6%. The In Situ 1 test media were lignocellulosic material and elemental sulfur. Neither material resulted in effluent toxicity when employed in other biofilters. An explanation was sought for the toxicity of the In Situ 1 effluent as determined by the WET test protocol.

Table 6. Acute Bioassay Results with *Cyprinella leedsi*

Biofilter	Effluent LC 50
Unsat CL4	> 100 %
Denit LS1	> 100 %
Denit SU1	> 100 %
InSitu 1	15.6%
InSitu 3	> 100 %

[1]Whole Effluent Toxicity Test Permit requirement of LC50 > 100%

Ammonia Toxicity Hypothesis A careful analysis was conducted of water quality of biofilter effluents, operational history of the biofilters, and conditions during the bioassay tests. In the 3/17/2011 sample event, ammonia in In Situ 1 effluent was at the relatively high concentration of 8.7 mg/L and was significantly higher than the other biofilter effluents (Table 2). Elevated ammonia levels in the sample can result in toxicity in the WET test procedure. The Table 2 data was reported for samples collected on 3/17/2010, or 45 days after initiation of operation of In Situ 1 under its reconfiguration. The bioassay test sample was collected on 2/17/2011, only 17 days after initiation of operation.

Nitrification often requires a relatively long period of time to fully establish after bioreactor startup, and it is reasonable to surmise that, when the bioassay sample was collected (2/17/2011),

the ammonia level in In Situ 1 effluent was appreciably higher than the 8.7 mg/L level reported on 3/17/2011 (Table 2). An example calculation can be used to posit a level of ammonia that could have been present in the In Situ I effluent on the day the bioassay sample was collected. Assuming 60% removal of a total influent nitrogen of 70 mg/L, the ;levels of nitrogen in In Situ 1 effluent would be 31.2 mg/L. If all effluent nitrogen were assumed to be ammonia, then the In Situ 1 bioassay sample have contained 31.2 mg/L ammonia nitrogen. Ammonia toxicity to the *Cyprinella leedsi* test organisms can occur at total ammonia nitrogen levels ranging from to 0.75 to 3.5 mg/L (Weeks, 2011).

The ammonia nitrogen reported in analytical results it total ammonia includes both ammonium ion (NH_4^+) and unionized ammonia (NH_3). Toxicity is due primarily to unionized ammonia. Speciation between ionized and unionized ammonia shifts towards the toxic NH_3 form with increases in pH and temperature (Stumm and Morgan, 1996). The WET acute bioassay is performed within one degree of 25C and it is not uncommon for pH to rise during the 96 hour bioassay (Weeks, 2011). The 25C temperature and rise in pH during the bioassay may have exacerbated ammonia toxicity by converting ammonia towards the toxic, unionized form. The bioassay pH at 24 to 48 hours is shown in Figure 2 for the five effluents at 100% concentration. The pH of bioassays increased with increasing effluent alkalinity, with In Situ 1 having the relatively elevated pH of 8.7. Chemical equilibrium calculations (Stumm and Morgan, 1996) were used to predict that 21% of total ammonia would be present in the toxic, unionized form in the 100% In Situ 1 bioassay treatment.

The WET test applied sample dilutions using control water with pH 7.9. Dilution of the In Situ 1 sample decreased the pH, which still remained greater than neutral (Figure 3). Chemical equilibrium calculations were used to predict unionized ammonia levels to which *Cyprinella leedsi* may have been exposed to during the bioassay (Figure 4). Unionized ammonia is shown for the pH of the bioassay dilutions (0 (control), 6.25, 12.5, 25, 50 and 1000 for two total ammonia levels: that measured on 3/17 (8.7 mg/L) and that calculated for the day of bioassay sampling. The total ammonia calculation was calculated for each dilution assuming the control dilution water ammonia was zero. The predicted unionized ammonia exceed the toxicity threshold level (based on total ammonia) levels for the less diluted samples (Figure 4). Observed *Cyprinella leedsi* mortality versus the unionized ammonia in In situ 1 bioassay treatments is shown in Figure 5 based on the total ammonia level in In Situ 1 effluent that was hypothesized for the say of bioassay sample collection. *Cyprinella leedsi* mortality was 100% for treatments with 100, 50 and 25% of in Situ 1 effluent. These results suggest that unionized ammonia was a causative factor in In Situ 1 effluent toxicity. This hypothetical development is based on limited data and cannot account for other processes that may have occurred, such as ammonia volatilization or degradation.

In Situ 1 and In Situ 3 had generally similar designs, with the exception that the upper twelve inches of media in In Situ 3 was clinoptilolite, versus torpedo and filter sand in In Situ 1. In Situ 3 effluent has a total ammonia nitrogen of only 0.20 mg/L (Table 2) and it did not exhibit the toxicity of In Situ 1. The similar designs of these biofilters provide a basis for comparison. Through ion exchange, clinoptilolite provides enhanced retention of ammonium when nitrification processes are otherwise incomplete (Smith, 2011). Clinoptilolite is also possibly superior to sand for the establishment of microbial activity. The ion exchange capacity of

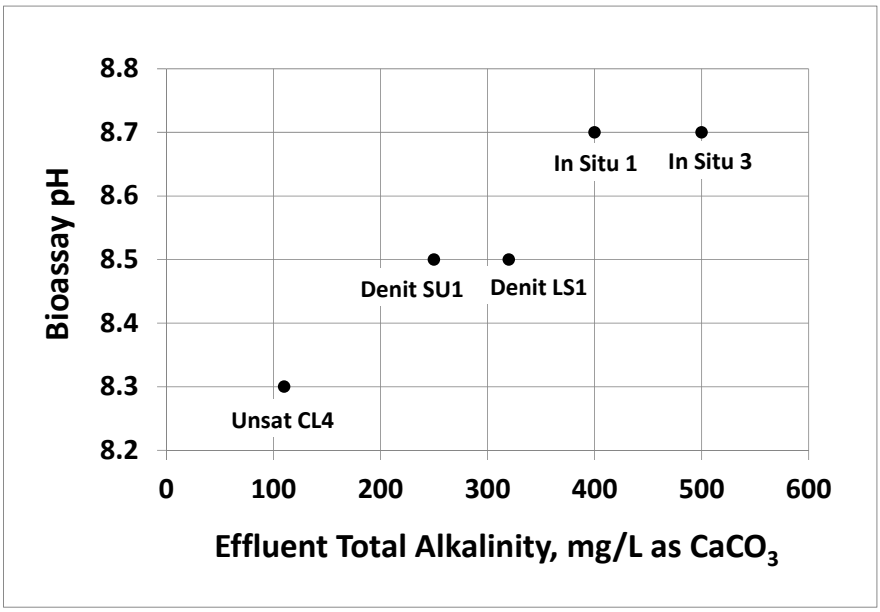

Figure 2. Biofilter Effluent Alkalinity and Bioassay pH

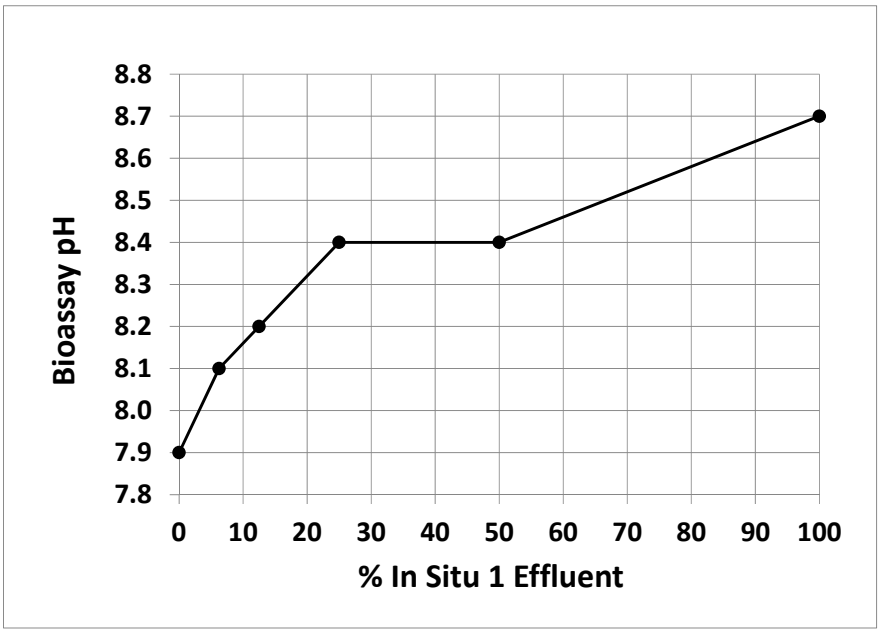

Figure 3. Dilution and pH in In Situ 1 Bioassay

clinoptilolite in the In Situ 3 biofilter greatly exceeded the exchange capacity needed to retain all of the nitrogen that entered In Situ 3 from startup to the 2/17/2011 sampling event, if all influent nitrogen were as ammonium ion. The absence of toxicity of In Situ 3 versus In Situ 1 may therefore be related to retention of ammonium ion by clinoptilolite media.

Analyses of the biofilter effluents, operational history and bioassay test conditions provides compelling evidence that toxicity in In Situ 1 effluent can be attributed to ammonia in the effluent. The level of ammonia in In Situ 1 effluent is a biological process issue related to

biofilter startup, the establishment of a relatively complete nitrification process, and the gradual reduction of effluent ammonia levels to non-toxic levels. To the extent that the ammonia toxicity hypothesis is a valid, the toxicity of In Situ 1 effluent in the WET test would not have been caused by the release of toxic constituents from the added test media.

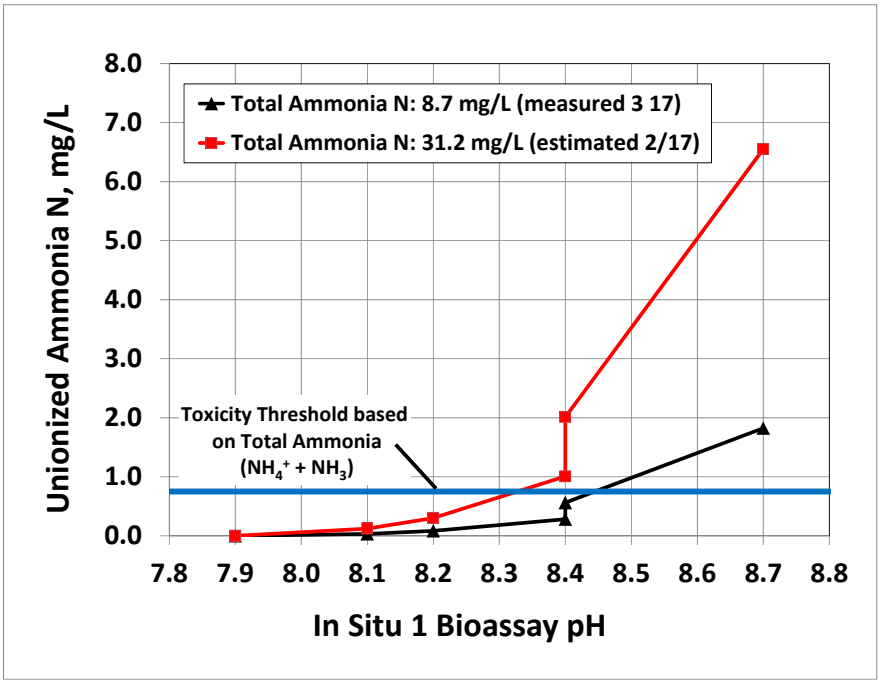

Figure 4. Unionized Ammonia and In Situ 1 Bioassay pH

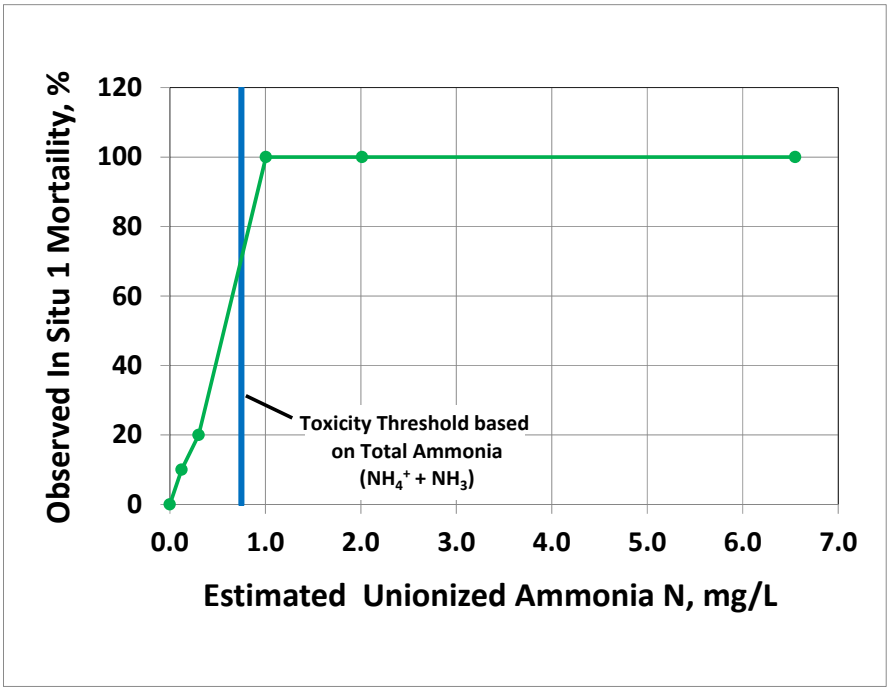

Figure 5. *Cyprinella leedsi* Mortality and Estimated Unionized Ammonia

Summary

Experiments were performed to evaluate clinoptilolite, elemental sulfur and lignocellulosic material (*Southern Yellow Pine*) according to *Florida's Additive Rule For Septic System Products* established by the Florida Department of Health (FDoH). Each material is a candidate media for biofilters that enhance nitrogen removal in onsite wastewater treatment systems. Clinoptilolite is a candidate media for aerobic biofilters, while elemental sulfur and lignocellulosic materials are intended as media in anoxic denitrifying biofilters. Samples from five biofilter effluents that were actively operating at the Passive Nitrogen Removal Study (PNRS) pilot facility in Wimauma, Florida. The test media components of the five biofilters were: clinoptilolite only, elemental sulfur only, lignocellulosic only, lignocellulosic and elemental sulfur, and clinoptilolite, lignocellulosic and elemental sulfur.

Additives testing was conducted by performing chemical analyses and acute toxicity bioassays on each effluent. Analysis of volatile organic compounds (VOCs) employed E.P.A. Methods 8260 and 8011. The VOC concentrations were below Method Detection Limits for the majority of chemicals in all five biofilter effluents. Of the three hundred and thirty five analytical VOC results for the five biofilter effluents, only two exceeded the Guidance Maximum Contaminant Level (GMCL) for VOCs established by the Florida Department of Health. The sole chemical exceeding its GMCL was P-Cymene (4-Isopropyltoluene), which was found only in the effluent of the three biofilters that contained recently added lignocellulose media. P-Cymene is a natural product of lignocellulose biodegradation which is purported be relatively stable under anoxic conditions but readily biodegradable under aerobic conditions. Effluent p-Cymene was at much higher concentration when lignocellulosic media was located within a fully saturated layer versus a non-saturated biofilter stratum, suggesting p-Cymene biodegradation within the biofilter matrix. P-Cymene would be expected also biodegrade in the aerobic receiving environments to which anoxic biofilter effluents could be directed. In addition, p-Cymene concentrations could decline substantially over time along with the general decrease in organic matter leaching that is observed phenomena with lignocellolosic media in denitrification biofilters.

Acute toxicity testing was performed by ninety-six hour bioassays using *Cyprinella leedsi* (Bannerfin Shiner) according to the E.P.A. Whole Effluent Toxicity (WET) protocol.
Four of the five biofilter effluents had Lethal Concentration 50 (LC50) of greater than 100%, indicating no toxicity by the WET test bioassay protocol. The four biofilters with no effluent toxicity included three biofilters which each contained only one test media, and a biofilter that contained all three of the test media. Each of the three test media, used singly or in combination, did not result in effluent toxicity according to the WET protocol. Only In Situ 1 effluent exhibited effluent toxicity, with an LC50 of 15.6%. The In Situ 1 the test media, however, did not exhibit effluent toxicity when used in other biofilters. Analyses of the biofilter effluent indicated that ammonia was likely present in In Situ 1 effluent at significantly higher concentration than in other tested effluents and identified unionized ammonia as a possible cause of toxicity of the In Situ 1 effluent. High ammonia levels are a process issue related to less than complete ammonia removal during the establishment of nitrification in biofilters that have been recently started. The evidence suggests that toxicity in In Situ 1 effluent was caused by effluent ammonia and not by the release of toxic constituents from the added test media.

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APPENDIX A

Clinoptilolite Material Data Safety Sheet

MATERIAL SAFETY DATA SHEET
CABSORB ZK403H

Date: 10/14/88 **Revised: 01/97** **Supersedes: N.A.**

I. PRODUCT IDENTIFICATION

Trade Name:	CABSORB®
Chemical Name:	Sodium, Potassium aluminosilicate mineral
Synonyms:	Zeolite, clinoptilolite
CAS Registry No:	1318-02-1
DOT Hazard Class:	N.A.
DOT Shipping Name:	N.A.

II. PHYSICAL DATA

Appearance and Odor:	Dry tan, to greenish yelow granules and powders. Odorless.
Specific Gravity (liquids only):	N.A.
Solubility in Water:	Negligible.
Vapor Pressure (mm Hg at ^{o} F, nonaqueous liquids only):	N.A.
Evaporation Rate (Butyl acetate = 100, nonaqueous liquids only):	N.A.
Solids Content (solutions, dispersions, or pastes only):.	N.A
Boiling Point (^{o} F, nonaqueous liquids only):	N.A.
pH (aqueous liquids only):	N.A.

III. FIRE AND EXPLOSION HAZARD DATA

Flash Point (^{o} F):	N.A.

Flammable Limits (vapor in air, Vol. %):	N.A.
Fire Extinguishing Media:	N.A.
Unusual Fire and Explosion Hazards:	None

IV. REACTIVITY DATA

Stability:	Stable
Conditions to Avoid:	N.A.
Incompatibility (Materials to Avoid):	N.A.
Hazardous Decomposition Products:	None

V. SPILL OR LEAK PROCEDURES

Environmental Hazards:	No known adverse effects.
Spillage:	Sweep, scoop, or vacuum discharged material.
Waste Disposal Method:	Landfill according to local, state, and federal regulations.

VI. HEALTH HAZARD DATA

Eye Contact:	May cause irritation.
Skin Contact:	May cause irritation.
Inhalation:	Causes Irritation.
Ingestion:	No hazards known or suspected.
Chronic Hazards:	No known chronic hazards. Not listed by OSHA, NTP or IARC as a carcinogen. Does not contain asbestos or fiberous zeolite minerals. Crystalline silica was not detected by X-Ray Defraction analysis, but may be present above the notification level of 0.10%. Crystalline silica is considered a hazard by inhalation. During October 1996, IARC reviewed the literature for polymorphs of crystalline silica and determined that there is suffient evidence in humans for the carcinegenity of inhaled crystalline silica in the form of quartz or cristobolite from occupational sources.

VII. SPECIAL PROTECTION INFORMATION

Respiratory Protection:	Use NIOSH approved dust mask or respirator where dust occurs.

Gloves:	Plastic, rubber or cotton.
Eye Protection:	Safety glasses, or chemical goggles.
Other Protective Equipment:	N.A.
Personal Hygiene:	Avoid breathing dust.
Engineering Control:	Use with adequate ventilation.

VIII. SUBSTANCES FOR WHICH STANDARDS HAVE BEEN SET

OSHA Permissible Exposure Limit or ACGIH Threshold Limit:	Values have not been established. Recommended Ceiling Limit: 15 mg/m3 Total dust. 5 mg/m^3 Respirable fraction.
Exposure Analysis Methods:	Respirable sampler or Midget impinger see: J. Am. Ind. Hyg.Assoc., 28:554 (1967)

IX. ADDITIONAL INFORMATION

Contact: Dan T. Eyde

GSA Resources, Inc.

Box 509

Cortaro, Arizona 85652

Telephone: (520) 744-8845

FAX:(520) 744-7770

e-mail: deyde@gsaresources.com

URL: http://www.gsaresources.com/

APPENDIX B

Elemental Sulfur Material Data Safety Sheets

MATERIAL SAFETY DATA SHEET

Flaked Sulfur, Pastille Sulfur

GEORGIA GULF SULFUR CORPORATION

Office: PO Box 1165, Valdosta Georgia 31603 ☎ phone (229) 244-0000 ☎ fax (229) 245-1664
Plant: PO Box 67, Bainbridge Georgia 31717 ☎ phone (229) 246-4552 ☎ fax (229) 246-3245
EMERGENCY ASSISTANCE:
CHEMTREC (800) 424-9300 (24 Hours)

SECTION 1 CHEMICAL IDENTITY

Trade Name & Synonyms: Sulphur, Flaked Sulfur, Granular Sulfur, Pastille Sulfur
Chemical Name: Sulfur
Family Name: Element - Sulfur
Chemical Formula: S_8
Appearance: Odorless, tasteless, pale yellow powder or solid
CAS Number: 7704-34-9
Hazardous Ingredient: Sulfur
% by Weight: 99.5% Min.

SECTION 2 PHYSICAL DATA

Appearance: Yellow colored lumps, crystals, powder, or formed shape
Odor: Odorless, or faint odor of rotten eggs
Purity: 99.5% Min.
Formula: S_8 (Rhombic or monoclinic)
Vapor Pressure: 0mmHG at 280^{O}F
Solubility In Water: Insoluble
Specific Gravity: 2.07 @ 70^{o}F
Boiling Point: 832^{o}F (444^{o}C)
Freezing/Melting Point: 230-246^{o}F (110-119^{o}C)
Bulk Density: Lumps 75-115 lbs./ft^3 Powder 33-80 lbs./ft^3

SECTION 3 FIRE AND EXPLOSION DATA

Flashpoint: 405^{O}F (207.2^{o}C)
Flammable Limits: LEL: 35 g/m^3 UEL: 1400 g/m^3
Auto-ignition Temperature: 478-511^{o}F (248-266^{o}C)
Extinguishing Media: Water fog, spray, or regular foam. Do not use a direct water stream.
Burning Sulfur: Decomposes into TOXIC sulfur oxide gasses such as: **Sulfur dioxide** and **Hydrogen sulfide**.

☛ **PRIMARY HAZARD:**

Sulfur dust suspended in air **ignites** easily, and can cause an **explosion** in confined areas. May be ignited by friction, static electricity, heat, sparks, or flames. Toxic gases will form upon combustion. Bulk/solid forms burn only at moderate rate, whereas dust burns with explosive violence.

☛ **FIRE:**

Wear full-faced, self-contained breathing apparatus and full protective clothing. **Use a water fog** to extinguish fire. Do not use solid streams of water; which could create sulfur dust clouds and cause an explosion or move burning sulfur to adjacent areas. **Fire will rekindle** until mass is cooled below 310^{o}F (154^{o}C). Cool surrounding areas with water fog to prevent re-igniting. Cool containers, tank cars, or trailer loads with flooding quantities of water until well after fire is out. **Evacuate** nonessential personnel from the fire area. If large fire, evacuate people downwind from fire. Isolate for ½ mile in all directions; consider evacuation for ½ mile in all directions. **Prevent human exposure** to smoke, fumes, or products of combustion (sulfur oxide gases). **Firemen exposed** to contaminated smoke should be immediately relieved and checked for symptoms of exposure to toxic gasses. ***Seek medical attention immediately!*** This should not be mistaken for heat exhaustion or smoke inhalation. These are extremely irritating to the respiratory tract and may cause breathing difficulty and pulmonary edema. Symptoms may be delayed several hours or longer depending upon exposure.

HAZARD RATING *0 = Least 1 = Slight 2 = Moderate 3 = High 4 = Extreme*
ACUTE HEALTH = 1
FIRE = 1
REACTIVITY = 0
CONTACT = 1

SECTION 4 REACTIVITY DATA

Stability: Stable
Conditions to Avoid (Instability): Keep from heat sources, sparks, and open flames.
Materials to Avoid (Incompatibility): Oxidizing agents, may react violently. Corrosive to copper and copper alloys. Damp sulfur will corrode steel.
Hazardous Polymerization: Will not occur.
Hazardous Decomposition Products: Oxides of sulfur gasses produced by burning sulfur.

SECTION 5 HEALTH HAZARDS

Sulfur is essentially non-toxic either through ingestion, inhalation, skin or eye contact. Individuals with known allergies to sulfide drugs may also have allergic reactions to elemental sulfur.

☛ SIGNS AND SYMPTOMS OF OVEREXPOSURE

Nose or throat irritation, coughing, chest discomfort, asthma, difficulty breathing, nausea, vomiting, stinging eye irritation, skin irritation, hives.

☛ EMERGENCY AND FIRST AID:

SKIN CONTACT:

No adverse effects. Skin irritation may be aggravated in persons with existing skin lesions. Wash exposed clothing separately before reuse.

***First Aid*:** Wash skin with plenty of mild soap and water.

EYE CONTACT:

Sulfur dust is an eye irritant. Avoid contact with eyes, especially contact wearers. Wear safety glasses. ***First Aid*:** In case of contact, immediately flush eyes with plenty of water for a minimum of fifteen minutes. Hold upper and lower lids apart to insure rinsing of the entire eye surface and lids. Do not use boric acid to rinse with; sulfur is an acid irritant. FOR SEVERE IRRITATION, GET MEDICAL ATTENTION, preferably an ophthalmologist.

INHALATION:

Prolonged inhalation may cause irritation of the respiratory tract. Breathing of dust may aggravate asthma and other pulmonary diseases. Individuals with known allergies to sulfide drugs may also have allergic reactions to elemental sulfur dust. Maintain adequate ventilation in area where dust is present. Wear dust masks and use NIOSH/MSHA approved dust respirator if airborne concentrations exceed exposure limits. ***First Aid*:** Move patient to fresh air. Watch for signs of allergic reaction. Use a bronchodilator inhaler if directed by asthma patient. Keep victim warm and quiet. If not breathing, clear airway and start mouth-to-mouth resuscitation. If heart has stopped beating, start cardiopulmonary resuscitation (CPR). GET MEDICAL ATTENTION.

INGESTION:

Ingested sulfur is converted to sulfides in the gastrointestinal tract, and ingestion of 10 to 20 grams has caused irritation of the GI tract and renal injury. Individuals with known allergies to sulfide drugs may also have allergic reactions to elemental sulfur. Swallowing large amounts may cause nausea and vomiting. Do not eat sulfur. ***First Aid*:** For large amounts ingested, if the victim is conscious and alert, give two or more glasses of water to drink. If available, give one tablespoon of Syrup of Ipecac to induce vomiting. If vomiting does occur, give fluids again. If vomiting has not occurred in twenty minutes, the same dose of Syrup of Ipecac may be repeated one additional time. Alternatively, vomiting may be induced by touching the back of the throat with a finger. Do not give anything by mouth to an unconscious or convulsing person. GET MEDICAL ATTENTION.

EXPOSURE LIMITS:

No exposure limits have been established.

TOXICOLOGY:

Oral LD_{50} (Rats):>5050 mg/kg body weight
Dermal LD_{50} (Rats):>2020 mg/kg body weight
Inhalation @ 90% LC_{50} (Rats):>5.49 mg/L air concentration
Skin Effects (Rabbits): Slightly irritating
Eye Effects (Rabbits): Minimal irritation in non-washed eyes

CARCINOGENICITY, TERATOGENICITY, MUTAGENICITY:

This product does not contain any ingredient designated by NTP, IARC, or OSHA as a probable human carcinogen.

SECTION 6 PRECAUTIONS FOR SAFE HANDLING AND USE

STORAGE:

Containers should be stored in a cool, dry, well-ventilated area. Keep container tightly closed. Store away from flammable materials, sources of heat, flame and sparks. Separate from chlorates, nitrates and other oxidizing agents. Exercise due caution to prevent damage to or leakage from container.

☛ EXPLOSION HAZARD:

Avoid any conditions that might tend to create a dust explosion. Be careful not to create dust. Maintain good housekeeping practices to minimize dust build-up and dispersion. Eliminate sources of ignition. Keep away from heat, sparks and flames. Use nonferrous tools to reduce sparking. Sweep or shovel up spilled material using a natural fiber broom and/or aluminum shovel to prevent sparking. Maintain adequate ventilation in all areas.

☛ SMALL or LARGE SPILLS:

No flares or flames in area. No smoking. Danger of dust explosion near sparks. Sweep or shovel up spilled material using a natural fiber broom and/or aluminum shovel to prevent sparking. Place sweepings in an appropriate chemical waste container for reclaiming or disposal in an approved facility. Wash spill site after clean up is complete. Wear protective clothing during clean up: safety glasses, rubber gloves, impervious clothing, dust mask or respirator.

SECTION 7 PROTECTIVE EQUIPMENT

WORK AREA:

Protective equipment should be used during the following procedures:

- Manufacture or formulation of this product.
- Repair and maintenance of contaminated equipment.
- Clean up of leaks and spills.
- Any situation that may result in hazardous exposure.

Maintain adequate ventilation and wear a respirator or a dust mask to prevent inhalation. Wear suitable, protective clothing and safety glasses to prevent skin and eye irritation from dust. Maintain a sink, safety shower and eyewash fountain in the work area. Wash skin thoroughly after handling and before eating or smoking. Wash contaminated clothing separately before reuse.

SECTION 8 DOT AND REGULATORY INFORMATION

TSCA:

This product is listed on the TSCA Inventory at CAS Registry Number 7704-34-9.

CERCLA:

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). If this product is accidentally spilled, it is not subject to any special reporting. We recommend that you contact state and local authorities to determine if there are other local reporting requirements.

SARA TITLE III:

Superfund Amendments and Reauthorization Act, Title III, Sections 311/312: None. Section 313: None. Section 302: None.

RCRA:

Resource Conservation and Recovery Act: not subject to reporting because sulfur is not identified as a hazardous waste.

SHIPPING CLASSIFICATION:

Solid sulfur is not subject to the requirements of Title 49 CFR Hazardous Materials Shipping Guidelines or the IMDG Code if transported in a non-bulk packaging (less than 400 kg per package) or is formed to a specific shape (e.g. prills, granules, pellets, pastilles, or flakes)**.**

This product is not a Marine Pollutant as defined in 40 CFR part 172.

FOR ADDITIONAL INFORMATION, CONTACT YOUR TECHNICAL SALES REPRESENTATIVE. FOR ADDITIONAL HEALTH & SAFETY INFORMATION, CALL GEORGIA GULF SULFUR CORPORATION AT 229-244-0000.

THE INFORMATION CONTAINED HEREIN IS BASED ON THE DATA AVAILABLE TO US AND IS BELIEVED TO BE CORRECT. HOWEVER, GEORGIA GULF SULFUR CORPORATION MAKES NO WARRANTY, EXPRESSED OR IMPLIED, REGARDING THE ACCURACY OF THIS DATA OR THE RESULTS TO BE OBTAINED FROM THE USE THEREOF. GEORGIA GULF SULFUR CORPORATION ASSUMES NO RESPONSIBILITY FOR INJURY FROM THE USE OF THE PRODUCT DESCRIBED HEREIN.

DATE OF ISSUE: DECEMBER 31, 2008

MATERIAL SAFETY DATA SHEET

SECTION 1. PRODUCT AND COMPANY INFORMATION

Trade Name (as labeled): GreenSun® ES 9905%

Common Name: Elemental Sulfur 995.5%

Manufactured By: CoreAgri, LLC
PO Box 1027
Arroyo Grande, CA 93421

Business Phone: (805) 201-9049

Emergency Phone: INFOTRAC – (800) 535-5053

Date of Preparation: December, 2009

SECTION 2. COMPOSITION AND INFORMATION ON INGREDIENTS

		Exposure Limits In Air	
Chemical Name	**CAS #**	**ACGIH TVL (ppm)**	**OSHA PEL (ppm)**
Sulfur	7704-34-9	NA	NA
NE = Not Established		NA = Not Available	

SECTION 3. EMERGENCY/HAZARDS OVERVIEW

Emergency Overview: Bright yellow colored, free flowing pastille with a possible slight sulfur odor. Dust may cause mild irritation. Sulfur trioxide fumes at temperatures above 1067 °F. Not D.O.T. regulated.

Symptoms Of Over Exposure:

Eyes: Sulfur dust may cause severe irritation with prolonged exposure.
Skin: Prolonged or repeated exposure to sulfur dust may cause skin irritation.
Inhalation: Sulfur dust may cause breathing difficulties and irritation of mucous membranes.
Ingestion: Solid sulfur can be digested in fairly large amounts without injury.
Injection: Not possible.

SECTION 4. FIRST-AID MEASURES

If Inhaled:	Remove to fresh air. If breathing becomes difficult, contact a medical physician. Give artificial respiration if victim is not breathing and obtain immediate medical attention.
If Ingested:	Seek Medical Attention. Do not induce vomiting unless directed to do so by a medical professional. Never induce vomiting or give diluents (milk or water) to someone who is unconscious, having convulsions, or who cannot swallow. If vomiting occurs,

	keep head lower than hips to prevent introduction of fluid into the lungs.
In Case Of Skin Contact:	Wash thoroughly with soap and water. Remove contaminated clothing and wash before reuse. Seek medical attention if skin becomes irritated.
In Case Of Eye Contact:	Flush immediately with water for at least 15 minutes, lifting the upper and lower eyelids occasionally. Call a physician if eye irritation persists.
Victims of chemical exposure and all rescuers must be taken for medical attention. Take a copy of label and MSDS to physician or health professional with victim.	

SECTION 5. FIRE-FIGHTING MEASURES

Flash Point:	Pure liquid sulfur, 370 °F. Impure liquid sulfur, 428 °F.
LEL Flammable Limits:	35 gm/m^3.
UEL Flammable Limits:	1400 gm/m^3.
Auto Ignition Temperature:	Dust Clouds, 374 °F.
Extinguishing Media:	Use any standard agent suitable for surrounding structural fire or for other chemicals that may be involved. Fine water sprays and/or dry chemical agent. CO_2, dry chemicals, or sand.
Fire Extinguishing Media to Avoid:	Hoses and extinguishers with pressure streams should be avoided where solid sulfur is dusty or where it may create a further hazard by raising more dust clouds.
Unusual Fire And Explosion Hazards:	Sulfur trioxide fumes at temperatures above 1067 °F. Dust suspended in air is readily ignited by flame, static electricity, or friction spark. Every reasonable step must be taken to minimize dust formation. Dust tight casings should be equipped with explosion relief vents. Sparkless electrical equipment is recommended. Handling equiqment must be grounded or bonded to avoid static electricity. Keep away from sources of flame or sparks. Detailed recommendations in Manufacturing Chemists Association SD-74 and National Safety Council 612 Bulletins covering "Sulfur" should be followed when handling GreenSun ES 99.5%.
Special Firefighting Procedures:	Wear positive pressure, self-contained breathing apparatus (SCBA) and goggles. Avoid exposure to smoke or fumes.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Spill And Leak Response: Pick up dry spills by scooping, shoveling, or vacuuming and place into containers for reuse or disposal. The minimum personal protective equipment should include rubber gloves, rubber apron, and chemical goggles. Gas masks or SCBA gear may be required. Uncontrolled releases should be responded to by trained personnel using pre-planned procedures. Keep material out of sewers, storm drains, and surface waters. Comply with all applicable government regulations on spill reporting, handling, and waste disposal. For landfill disposal, mix with limestone 3 times the weight of sulfur.

SECTION 7. STORAGE AND HANDLING

Storage Practices: Store in a cool (above 40 °F), dry, well-ventilated area away from incompatible materials. Solid becomes corrosive to metals when stored wet. Sulfur bentonite fertilizer will physically break down when exposed to moisture.

Handling Practices: Wash thoroughly after handling. Avoid contact with eyes, skin, and clothing. Wash with soap and water after handling.

Work/Hygiene Practices: Avoid getting chemicals ON YOU or IN YOU. Wash hands with soap and water after handling chemicals. Do not eat or drink around or while handling chemicals. Keep out of reach of children.

SECTION 8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

Ventilation/Engineering Controls: Use of local exhaust is recommended at product transfer points and where dusty conditions exist.

Respiratory Protection: For normal product handling, use any NIOSH approved air-purifying dust respirator. For extremely dusty conditions, a full facepiece purifying particulate respirator is recommended.

Eye Protection: Chemical dust/splash goggles or full-face shield to prevent eye contact. As a general rule, contact lenses should not be worn when working with chemicals because they contribute to the severity of an eye injury.

Hand Protection: Wear cotton or canvas protective glove to prevent contact. Rubber gloves may be used if product may become wet or moist.

Body Protection: Use body protection appropriate for task. Chemical-resistant coveralls and rubber aprons are generally acceptable.

Other Protective Measures: An eyewash and safety shower should be nearby and ready for use.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance:	Bright yellow colored pastille.	**Boiling Point:**	832 °F.
Odor:	May have slight sulfur odor.	**Crystallization Point:**	NA.
pH:	Neutral when dry.	**Freezing Point:**	246 °F.
Water Solubility:	Insoluble	**Vapor Pressure:**	Solid, less than 0.0001 mm. hg at 68 °F
Density:	76 lbs/ft^3.	**Vapor Density (air = 1):**	>1.

Specific Gravity (H_2O = 1): Solid, 2.07 gm/ml | NA = Not Available.

SECTION 10. STABILITY AND REACTIVITY

Stability: Stable.

Conditions To Avoid: Fire and dust explosions.

Incompatibility: Alkaline materials, or mixtures with chlorates, nitrates, or other oxidizing agents.

Hazardous Polymerization: Will not occur.

SECTION 11. TOXICOLOGICAL INFORMATION

Toxicity Data: NA.

Acute Effects:

Eyes: Mild irritant. May cause redness, tearing and/or burning.
Skin: Mild irritant, especially with prolonged exposure or when in contact with moisture.
Ingestion: Nausea and upset stomach
Inhalation: Moderate irritation of nose and throat from dust. May cause dry coughing, wheezing, chest tightness, and burning of mucous membranes.

Chronic Effects: None known.

SECTION 12. ECOLOGICAL INFORMATION

Environmental Stability: Sulfur, is stable in the environment. Its transport in the environment depends upon the exact compound, the pH, the soil type, and the salinity. All work practices should be aimed at eliminating environmental contamination.

SECTION 13. DISPOSAL CONSIDERATIONS

Do not contaminate lakes, streams, ponds, estuaries, oceans, or other waters by discharge of waste effluents or equipment rinsate. Dispose of waste effluents according to federal, state, and local regulations. For landfill disposal, mix with limestone 3 times the weight of sulfur. Chemical additions or other alterations of this product will invalidate any disposal information in this MSDS.

SECTION 14. TRANSPORTATION INFORMATION

This product is not regulated in interstate or intrastate transport.

SECTION 15. REGULATORY INFORMATION

SARA Reporting Requirements: This material does not contain toxic chemicals subject to reporting requirements of Section 313, Title III of the Superfund Amendments and Reauthorization Act of 1986.

California Proposition 65: WARNING. This product contains chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

SECTION 16. OTHER INFORMATION

The information and recommendations herein are taken from data contained in independent, industry recognized references including NIOSH, OSHA, ANSI, and NFPA. This information is, as of date listed above, true and accurate to the best of CoreAgri, LLC knowledge. It is intended for use by persons possessing technical knowledge and at their own discretion and risk. Since actual use is beyond our control, no guarantee, express or implied, and no liability is assumed by CoreAgri, LLC in conjunction with the use of this information. Actual conditions of use and handling may require consideration of information other than, or in addition to, that which is provided herein.

APPENDIX D

E.P.A. Method 8260 Laboratory Report

Pace Analytical Services, Inc.
8 East Tower Circle
Ormond Beach, FL 32174
(386)672-5668

April 04, 2011

Dr. Daniel Smith
Applied Environmental Technology
10809 Cedar Cove Drive
Thonotosassa, FL 33592

RE: Project: 8260
Pace Project No.: 3527145

Dear Dr. Smith:
Enclosed are the analytical results for sample(s) received by the laboratory on March 03, 2011. The results relate only to the samples included in this report. Results reported herein conform to the most current NELAC standards, where applicable, unless otherwise narrated in the body of the report.

April 4, 2011: A revised report was issued to the client reporting Vinyl Chloride for all samples.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Sakina Mckenzie

sakina.mckenzie@pacelabs.com
Project Manager

Enclosures

Pace Analytical Services, Inc.
8 East Tower Circle
Ormond Beach, FL 32174
(386)672-5668

CERTIFICATIONS

Project: 8260
Pace Project No.: 3527145

Ormond Beach Certification IDs

8 East Tower Circle, Ormond Beach, FL 32174
Alabama Certification #: 41320
Arizona Certification #: AZ0735
Colorado Certification: FL NELAC Reciprocity
Connecticut Certification #: PH 0216
Florida Certification #: E83079
Georgia Certification #: 955
Guam Certification: FL NELAC Reciprocity
Hawaii Certification: FL NELAC Reciprocity
Kansas Certification #: E-10383
Kentucky Certification #: 90050
Louisiana Certification #: LA090012
Louisiana Environmental Certificate #: 05007
Maine Certification #: FL1264
Massachusetts Certification #: M-FL1264
Michigan Certification #: 9911
Mississippi Certification: FL NELAC Reciprocity
Montana Certification #: Cert 0074
Nevada Certification: FL NELAC Reciprocity
New Hampshire Certification #: 2958
New Jersey Certification #: FL765
New York Certification #: 11608
North Carolina Environmental Certificate #: 667
North Carolina Certification #: 12710
Pennsylvania Certification #: 68-547
Puerto Rico Certification #: FL01264
Tennessee Certification #: TN02974
Texas Certification: FL NELAC Reciprocity
Virginia Certification #: 00432
Wyoming Certification: FL NELAC Reciprocity

Pace Analytical Services, Inc.
8 East Tower Circle
Ormond Beach, FL 32174
(386)672-5668

SAMPLE SUMMARY

Project: 8260
Pace Project No.: 3527145

Lab ID	Sample ID	Matrix	Date Collected	Date Received
3527145001	**Septic Tank**	Water	03/01/11 15:30	03/03/11 07:00
3527145002	**ONSAT CL4**	Water	03/01/11 15:30	03/03/11 07:00
3527145003	**DENTT LS1**	Water	03/01/11 15:30	03/03/11 07:00
3527145004	**DENTT SU1**	Water	03/01/11 15:30	03/03/11 07:00
3527145005	**INSITU 1**	Water	03/01/11 15:30	03/03/11 07:00
3527145006	**INSITU 3**	Water	03/01/11 15:30	03/03/11 07:00

Pace Analytical Services, Inc.
8 East Tower Circle
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(386)672-5668

SAMPLE ANALYTE COUNT

Project: 8260
Pace Project No.: 3527145

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
3527145001	**Septic Tank**	EPA 8260	ABD	69	PASI-O
3527145002	**ONSAT CL4**	EPA 8260	ABD	69	PASI-O
3527145003	**DENTT LS1**	EPA 8260	ABD	69	PASI-O
3527145004	**DENTT SU1**	EPA 8260	ABD	69	PASI-O
3527145005	**INSITU 1**	EPA 8260	ABD	69	PASI-O
3527145006	**INSITU 3**	EPA 8260	ABD	69	PASI-O

Pace Analytical Services, Inc.
8 East Tower Circle
Ormond Beach, FL 32174
(386)672-5668

ANALYTICAL RESULTS

Project: 8260
Pace Project No.: 3527145

Sample: Septic Tank **Lab ID: 3527145001** Collected: 03/01/11 15:30 Received: 03/03/11 07:00 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8260 MSV	Analytical Method: EPA 8260								
Acetone	**255**	ug/L	50.0	25.0	5		03/15/11 21:13	67-64-1	
Benzene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:37	71-43-2	
Bromobenzene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:37	108-86-1	
Bromochloromethane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:37	74-97-5	
Bromodichloromethane	**0.27U**	ug/L	0.60	0.27	1		03/14/11 17:37	75-27-4	
Bromoform	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:37	75-25-2	
Bromomethane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:37	74-83-9	
2-Butanone (MEK)	**7.8 I**	ug/L	10.0	5.0	1		03/14/11 17:37	78-93-3	
n-Butylbenzene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:37	104-51-8	
sec-Butylbenzene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:37	135-98-8	
tert-Butylbenzene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:37	98-06-6	
Carbon disulfide	**3.1**	ug/L	1.0	0.50	1		03/14/11 17:37	75-15-0	V
Carbon tetrachloride	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:37	56-23-5	
Chlorobenzene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:37	108-90-7	
Chloroethane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:37	75-00-3	
2-Chloroethylvinyl ether	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:37	110-75-8	
Chloroform	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:37	67-66-3	
Chloromethane	**0.62U**	ug/L	1.0	0.62	1		03/14/11 17:37	74-87-3	
2-Chlorotoluene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:37	95-49-8	
4-Chlorotoluene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:37	106-43-4	
Dibromochloromethane	**0.26U**	ug/L	0.50	0.26	1		03/14/11 17:37	124-48-1	
Dibromomethane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:37	74-95-3	
1,2-Dichlorobenzene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:37	95-50-1	
1,3-Dichlorobenzene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:37	541-73-1	
1,4-Dichlorobenzene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:37	106-46-7	
Dichlorodifluoromethane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:37	75-71-8	
1,1-Dichloroethane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:37	75-34-3	
1,2-Dichloroethane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:37	107-06-2	
1,1-Dichloroethene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:37	75-35-4	
cis-1,2-Dichloroethene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:37	156-59-2	
trans-1,2-Dichloroethene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:37	156-60-5	
1,2-Dichloropropane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:37	78-87-5	
1,3-Dichloropropane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:37	142-28-9	
2,2-Dichloropropane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:37	594-20-7	
1,1-Dichloropropene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:37	563-58-6	
cis-1,3-Dichloropropene	**0.25U**	ug/L	0.50	0.25	1		03/14/11 17:37	10061-01-5	
trans-1,3-Dichloropropene	**0.25U**	ug/L	0.50	0.25	1		03/14/11 17:37	10061-02-6	
Ethylbenzene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:37	100-41-4	
Hexachloro-1,3-butadiene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:37	87-68-3	
Isopropylbenzene (Cumene)	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:37	98-82-8	
p-Isopropyltoluene	**0.62 I**	ug/L	1.0	0.50	1		03/14/11 17:37	99-87-6	
Methylene Chloride	**2.5U**	ug/L	5.0	2.5	1		03/14/11 17:37	75-09-2	
4-Methyl-2-pentanone (MIBK)	**5.0U**	ug/L	10.0	5.0	1		03/14/11 17:37	108-10-1	
Methyl-tert-butyl ether	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:37	1634-04-4	L3
Naphthalene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:37	91-20-3	
n-Propylbenzene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:37	103-65-1	

Pace Analytical Services, Inc.
8 East Tower Circle
Ormond Beach, FL 32174
(386)672-5668

ANALYTICAL RESULTS

Project: 8260
Pace Project No.: 3527145

Sample: Septic Tank **Lab ID: 3527145001** Collected: 03/01/11 15:30 Received: 03/03/11 07:00 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8260 MSV	Analytical Method: EPA 8260								
Styrene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:37	100-42-5	
1,1,1,2-Tetrachloroethane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:37	630-20-6	
1,1,2,2-Tetrachloroethane	**0.18U**	ug/L	0.50	0.18	1		03/14/11 17:37	79-34-5	
Tetrachloroethene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:37	127-18-4	
Toluene	**40.5**	ug/L	1.0	0.50	1		03/14/11 17:37	108-88-3	
1,2,3-Trichlorobenzene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:37	87-61-6	
1,2,4-Trichlorobenzene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:37	120-82-1	
1,1,1-Trichloroethane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:37	71-55-6	
1,1,2-Trichloroethane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:37	79-00-5	
Trichloroethene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:37	79-01-6	
Trichlorofluoromethane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:37	75-69-4	
1,2,3-Trichloropropane	**0.36U**	ug/L	0.50	0.36	1		03/14/11 17:37	96-18-4	
1,1,2-Trichlorotrifluoroethane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:37	76-13-1	
1,2,4-Trimethylbenzene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:37	95-63-6	
1,3,5-Trimethylbenzene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:37	108-67-8	
Vinyl chloride	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:37	75-01-4	
Xylene (Total)	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:37	1330-20-7	
m&p-Xylene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:37	179601-23-1	
o-Xylene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:37	95-47-6	
4-Bromofluorobenzene (S)	100	%	70-114		1		03/14/11 17:37	460-00-4	
Dibromofluoromethane (S)	98	%	88-117		1		03/14/11 17:37	1868-53-7	
1,2-Dichloroethane-d4 (S)	101	%	86-125		1		03/14/11 17:37	17060-07-0	
Toluene-d8 (S)	101	%	87-113		1		03/14/11 17:37	2037-26-5	

Pace Analytical Services, Inc.
8 East Tower Circle
Ormond Beach, FL 32174
(386)672-5668

ANALYTICAL RESULTS

Project: 8260
Pace Project No.: 3527145

Sample: ONSAT CL4 **Lab ID: 3527145002** Collected: 03/01/11 15:30 Received: 03/03/11 07:00 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8260 MSV	Analytical Method: EPA 8260								
Acetone	**5.0U**	ug/L	10.0	5.0	1		03/14/11 17:13	67-64-1	
Benzene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:13	71-43-2	
Bromobenzene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:13	108-86-1	
Bromochloromethane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:13	74-97-5	
Bromodichloromethane	**0.27U**	ug/L	0.60	0.27	1		03/14/11 17:13	75-27-4	
Bromoform	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:13	75-25-2	
Bromomethane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:13	74-83-9	
2-Butanone (MEK)	**5.0U**	ug/L	10.0	5.0	1		03/14/11 17:13	78-93-3	
n-Butylbenzene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:13	104-51-8	
sec-Butylbenzene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:13	135-98-8	
tert-Butylbenzene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:13	98-06-6	
Carbon disulfide	**0.72 I**	ug/L	1.0	0.50	1		03/14/11 17:13	75-15-0	V
Carbon tetrachloride	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:13	56-23-5	
Chlorobenzene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:13	108-90-7	
Chloroethane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:13	75-00-3	
2-Chloroethylvinyl ether	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:13	110-75-8	
Chloroform	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:13	67-66-3	
Chloromethane	**0.62U**	ug/L	1.0	0.62	1		03/14/11 17:13	74-87-3	
2-Chlorotoluene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:13	95-49-8	
4-Chlorotoluene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:13	106-43-4	
Dibromochloromethane	**0.26U**	ug/L	0.50	0.26	1		03/14/11 17:13	124-48-1	
Dibromomethane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:13	74-95-3	
1,2-Dichlorobenzene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:13	95-50-1	
1,3-Dichlorobenzene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:13	541-73-1	
1,4-Dichlorobenzene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:13	106-46-7	
Dichlorodifluoromethane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:13	75-71-8	
1,1-Dichloroethane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:13	75-34-3	
1,2-Dichloroethane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:13	107-06-2	
1,1-Dichloroethene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:13	75-35-4	
cis-1,2-Dichloroethene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:13	156-59-2	
trans-1,2-Dichloroethene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:13	156-60-5	
1,2-Dichloropropane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:13	78-87-5	
1,3-Dichloropropane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:13	142-28-9	
2,2-Dichloropropane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:13	594-20-7	
1,1-Dichloropropene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:13	563-58-6	
cis-1,3-Dichloropropene	**0.25U**	ug/L	0.50	0.25	1		03/14/11 17:13	10061-01-5	
trans-1,3-Dichloropropene	**0.25U**	ug/L	0.50	0.25	1		03/14/11 17:13	10061-02-6	
Ethylbenzene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:13	100-41-4	
Hexachloro-1,3-butadiene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:13	87-68-3	
Isopropylbenzene (Cumene)	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:13	98-82-8	
p-Isopropyltoluene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:13	99-87-6	
Methylene Chloride	**2.5U**	ug/L	5.0	2.5	1		03/14/11 17:13	75-09-2	
4-Methyl-2-pentanone (MIBK)	**5.0U**	ug/L	10.0	5.0	1		03/14/11 17:13	108-10-1	
Methyl-tert-butyl ether	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:13	1634-04-4	L3
Naphthalene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:13	91-20-3	
n-Propylbenzene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:13	103-65-1	

Pace Analytical Services, Inc.
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ANALYTICAL RESULTS

Project: 8260
Pace Project No.: 3527145

Sample: ONSAT CL4 **Lab ID: 3527145002** Collected: 03/01/11 15:30 Received: 03/03/11 07:00 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8260 MSV	Analytical Method: EPA 8260								
Styrene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:13	100-42-5	
1,1,1,2-Tetrachloroethane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:13	630-20-6	
1,1,2,2-Tetrachloroethane	**0.18U**	ug/L	0.50	0.18	1		03/14/11 17:13	79-34-5	
Tetrachloroethene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:13	127-18-4	
Toluene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:13	108-88-3	
1,2,3-Trichlorobenzene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:13	87-61-6	
1,2,4-Trichlorobenzene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:13	120-82-1	
1,1,1-Trichloroethane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:13	71-55-6	
1,1,2-Trichloroethane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:13	79-00-5	
Trichloroethene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:13	79-01-6	
Trichlorofluoromethane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:13	75-69-4	
1,2,3-Trichloropropane	**0.36U**	ug/L	0.50	0.36	1		03/14/11 17:13	96-18-4	
1,1,2-Trichlorotrifluoroethane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:13	76-13-1	
1,2,4-Trimethylbenzene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:13	95-63-6	
1,3,5-Trimethylbenzene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:13	108-67-8	
Vinyl chloride	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:13	75-01-4	
Xylene (Total)	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:13	1330-20-7	
m&p-Xylene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:13	179601-23-1	
o-Xylene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:13	95-47-6	
4-Bromofluorobenzene (S)	99	%	70-114		1		03/14/11 17:13	460-00-4	
Dibromofluoromethane (S)	95	%	88-117		1		03/14/11 17:13	1868-53-7	
1,2-Dichloroethane-d4 (S)	104	%	86-125		1		03/14/11 17:13	17060-07-0	
Toluene-d8 (S)	101	%	87-113		1		03/14/11 17:13	2037-26-5	

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ANALYTICAL RESULTS

Project: 8260
Pace Project No.: 3527145

Sample: DENTT LS1 **Lab ID: 3527145003** Collected: 03/01/11 15:30 Received: 03/03/11 07:00 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8260 MSV	Analytical Method: EPA 8260								
Acetone	**30.2**	ug/L	10.0	5.0	1		03/14/11 18:26	67-64-1	
Benzene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:26	71-43-2	
Bromobenzene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:26	108-86-1	
Bromochloromethane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:26	74-97-5	
Bromodichloromethane	**0.27U**	ug/L	0.60	0.27	1		03/14/11 18:26	75-27-4	
Bromoform	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:26	75-25-2	
Bromomethane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:26	74-83-9	
2-Butanone (MEK)	**17.3**	ug/L	10.0	5.0	1		03/14/11 18:26	78-93-3	
n-Butylbenzene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:26	104-51-8	
sec-Butylbenzene	**44.3**	ug/L	1.0	0.50	1		03/14/11 18:26	135-98-8	
tert-Butylbenzene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:26	98-06-6	
Carbon disulfide	**0.92 I**	ug/L	1.0	0.50	1		03/14/11 18:26	75-15-0	V
Carbon tetrachloride	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:26	56-23-5	
Chlorobenzene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:26	108-90-7	
Chloroethane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:26	75-00-3	
2-Chloroethylvinyl ether	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:26	110-75-8	
Chloroform	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:26	67-66-3	
Chloromethane	**0.62U**	ug/L	1.0	0.62	1		03/14/11 18:26	74-87-3	
2-Chlorotoluene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:26	95-49-8	
4-Chlorotoluene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:26	106-43-4	
Dibromochloromethane	**0.26U**	ug/L	0.50	0.26	1		03/14/11 18:26	124-48-1	
Dibromomethane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:26	74-95-3	
1,2-Dichlorobenzene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:26	95-50-1	
1,3-Dichlorobenzene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:26	541-73-1	
1,4-Dichlorobenzene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:26	106-46-7	
Dichlorodifluoromethane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:26	75-71-8	
1,1-Dichloroethane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:26	75-34-3	
1,2-Dichloroethane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:26	107-06-2	
1,1-Dichloroethene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:26	75-35-4	
cis-1,2-Dichloroethene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:26	156-59-2	
trans-1,2-Dichloroethene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:26	156-60-5	
1,2-Dichloropropane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:26	78-87-5	
1,3-Dichloropropane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:26	142-28-9	
2,2-Dichloropropane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:26	594-20-7	
1,1-Dichloropropene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:26	563-58-6	
cis-1,3-Dichloropropene	**0.25U**	ug/L	0.50	0.25	1		03/14/11 18:26	10061-01-5	
trans-1,3-Dichloropropene	**0.25U**	ug/L	0.50	0.25	1		03/14/11 18:26	10061-02-6	
Ethylbenzene	**0.67 I**	ug/L	1.0	0.50	1		03/14/11 18:26	100-41-4	
Hexachloro-1,3-butadiene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:26	87-68-3	
Isopropylbenzene (Cumene)	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:26	98-82-8	
p-Isopropyltoluene	**1380**	ug/L	50.0	25.0	50		03/15/11 21:47	99-87-6	
Methylene Chloride	**2.5U**	ug/L	5.0	2.5	1		03/14/11 18:26	75-09-2	
4-Methyl-2-pentanone (MIBK)	**5.0U**	ug/L	10.0	5.0	1		03/14/11 18:26	108-10-1	
Methyl-tert-butyl ether	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:26	1634-04-4	L3
Naphthalene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:26	91-20-3	
n-Propylbenzene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:26	103-65-1	

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ANALYTICAL RESULTS

Project: 8260
Pace Project No.: 3527145

Sample: DENTT LS1 **Lab ID: 3527145003** Collected: 03/01/11 15:30 Received: 03/03/11 07:00 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8260 MSV	Analytical Method: EPA 8260								
Styrene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:26	100-42-5	
1,1,1,2-Tetrachloroethane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:26	630-20-6	
1,1,2,2-Tetrachloroethane	**0.18U**	ug/L	0.50	0.18	1		03/14/11 18:26	79-34-5	
Tetrachloroethene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:26	127-18-4	
Toluene	**0.57 I**	ug/L	1.0	0.50	1		03/14/11 18:26	108-88-3	
1,2,3-Trichlorobenzene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:26	87-61-6	
1,2,4-Trichlorobenzene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:26	120-82-1	
1,1,1-Trichloroethane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:26	71-55-6	
1,1,2-Trichloroethane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:26	79-00-5	
Trichloroethene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:26	79-01-6	
Trichlorofluoromethane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:26	75-69-4	
1,2,3-Trichloropropane	**0.36U**	ug/L	0.50	0.36	1		03/14/11 18:26	96-18-4	
1,1,2-Trichlorotrifluoroethane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:26	76-13-1	
1,2,4-Trimethylbenzene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:26	95-63-6	
1,3,5-Trimethylbenzene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:26	108-67-8	
Vinyl chloride	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:26	75-01-4	
Xylene (Total)	**0.80 I**	ug/L	1.0	0.50	1		03/14/11 18:26	1330-20-7	
m&p-Xylene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:26	179601-23-1	
o-Xylene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:26	95-47-6	
4-Bromofluorobenzene (S)	97	%	70-114		1		03/14/11 18:26	460-00-4	
Dibromofluoromethane (S)	96	%	88-117		1		03/14/11 18:26	1868-53-7	
1,2-Dichloroethane-d4 (S)	101	%	86-125		1		03/14/11 18:26	17060-07-0	
Toluene-d8 (S)	98	%	87-113		1		03/14/11 18:26	2037-26-5	

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ANALYTICAL RESULTS

Project: 8260
Pace Project No.: 3527145

Sample: DENTT SU1 **Lab ID: 3527145004** Collected: 03/01/11 15:30 Received: 03/03/11 07:00 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8260 MSV	Analytical Method: EPA 8260								
Acetone	**7.6 I**	ug/L	10.0	5.0	1		03/14/11 18:01	67-64-1	
Benzene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:01	71-43-2	
Bromobenzene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:01	108-86-1	
Bromochloromethane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:01	74-97-5	
Bromodichloromethane	**0.27U**	ug/L	0.60	0.27	1		03/14/11 18:01	75-27-4	
Bromoform	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:01	75-25-2	
Bromomethane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:01	74-83-9	
2-Butanone (MEK)	**6.1 I**	ug/L	10.0	5.0	1		03/14/11 18:01	78-93-3	
n-Butylbenzene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:01	104-51-8	
sec-Butylbenzene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:01	135-98-8	
tert-Butylbenzene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:01	98-06-6	
Carbon disulfide	**1.5**	ug/L	1.0	0.50	1		03/14/11 18:01	75-15-0	V
Carbon tetrachloride	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:01	56-23-5	
Chlorobenzene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:01	108-90-7	
Chloroethane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:01	75-00-3	
2-Chloroethylvinyl ether	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:01	110-75-8	
Chloroform	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:01	67-66-3	
Chloromethane	**0.62U**	ug/L	1.0	0.62	1		03/14/11 18:01	74-87-3	
2-Chlorotoluene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:01	95-49-8	
4-Chlorotoluene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:01	106-43-4	
Dibromochloromethane	**0.26U**	ug/L	0.50	0.26	1		03/14/11 18:01	124-48-1	
Dibromomethane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:01	74-95-3	
1,2-Dichlorobenzene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:01	95-50-1	
1,3-Dichlorobenzene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:01	541-73-1	
1,4-Dichlorobenzene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:01	106-46-7	
Dichlorodifluoromethane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:01	75-71-8	
1,1-Dichloroethane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:01	75-34-3	
1,2-Dichloroethane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:01	107-06-2	
1,1-Dichloroethene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:01	75-35-4	
cis-1,2-Dichloroethene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:01	156-59-2	
trans-1,2-Dichloroethene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:01	156-60-5	
1,2-Dichloropropane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:01	78-87-5	
1,3-Dichloropropane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:01	142-28-9	
2,2-Dichloropropane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:01	594-20-7	
1,1-Dichloropropene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:01	563-58-6	
cis-1,3-Dichloropropene	**0.25U**	ug/L	0.50	0.25	1		03/14/11 18:01	10061-01-5	
trans-1,3-Dichloropropene	**0.25U**	ug/L	0.50	0.25	1		03/14/11 18:01	10061-02-6	
Ethylbenzene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:01	100-41-4	
Hexachloro-1,3-butadiene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:01	87-68-3	
Isopropylbenzene (Cumene)	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:01	98-82-8	
p-Isopropyltoluene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:01	99-87-6	
Methylene Chloride	**2.5U**	ug/L	5.0	2.5	1		03/14/11 18:01	75-09-2	
4-Methyl-2-pentanone (MIBK)	**5.0U**	ug/L	10.0	5.0	1		03/14/11 18:01	108-10-1	
Methyl-tert-butyl ether	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:01	1634-04-4	L3
Naphthalene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:01	91-20-3	
n-Propylbenzene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:01	103-65-1	

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ANALYTICAL RESULTS

Project: 8260
Pace Project No.: 3527145

Sample: DENTT SU1 **Lab ID: 3527145004** Collected: 03/01/11 15:30 Received: 03/03/11 07:00 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8260 MSV	Analytical Method: EPA 8260								
Styrene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:01	100-42-5	
1,1,1,2-Tetrachloroethane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:01	630-20-6	
1,1,2,2-Tetrachloroethane	**0.18U**	ug/L	0.50	0.18	1		03/14/11 18:01	79-34-5	
Tetrachloroethene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:01	127-18-4	
Toluene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:01	108-88-3	
1,2,3-Trichlorobenzene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:01	87-61-6	
1,2,4-Trichlorobenzene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:01	120-82-1	
1,1,1-Trichloroethane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:01	71-55-6	
1,1,2-Trichloroethane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:01	79-00-5	
Trichloroethene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:01	79-01-6	
Trichlorofluoromethane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:01	75-69-4	
1,2,3-Trichloropropane	**0.36U**	ug/L	0.50	0.36	1		03/14/11 18:01	96-18-4	
1,1,2-Trichlorotrifluoroethane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:01	76-13-1	
1,2,4-Trimethylbenzene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:01	95-63-6	
1,3,5-Trimethylbenzene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:01	108-67-8	
Vinyl chloride	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:01	75-01-4	
Xylene (Total)	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:01	1330-20-7	
m&p-Xylene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:01	179601-23-1	
o-Xylene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:01	95-47-6	
4-Bromofluorobenzene (S)	97	%	70-114		1		03/14/11 18:01	460-00-4	
Dibromofluoromethane (S)	95	%	88-117		1		03/14/11 18:01	1868-53-7	
1,2-Dichloroethane-d4 (S)	100	%	86-125		1		03/14/11 18:01	17060-07-0	
Toluene-d8 (S)	98	%	87-113		1		03/14/11 18:01	2037-26-5	

Pace Analytical Services, Inc.
8 East Tower Circle
Ormond Beach, FL 32174
(386)672-5668

ANALYTICAL RESULTS

Project: 8260
Pace Project No.: 3527145

Sample: INSITU 1 **Lab ID: 3527145005** Collected: 03/01/11 15:30 Received: 03/03/11 07:00 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8260 MSV	Analytical Method: EPA 8260								
Acetone	**5.0U**	ug/L	10.0	5.0	1		03/14/11 18:50	67-64-1	
Benzene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:50	71-43-2	
Bromobenzene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:50	108-86-1	
Bromochloromethane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:50	74-97-5	
Bromodichloromethane	**0.27U**	ug/L	0.60	0.27	1		03/14/11 18:50	75-27-4	
Bromoform	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:50	75-25-2	
Bromomethane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:50	74-83-9	
2-Butanone (MEK)	**5.0U**	ug/L	10.0	5.0	1		03/14/11 18:50	78-93-3	
n-Butylbenzene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:50	104-51-8	
sec-Butylbenzene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:50	135-98-8	
tert-Butylbenzene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:50	98-06-6	
Carbon disulfide	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:50	75-15-0	
Carbon tetrachloride	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:50	56-23-5	
Chlorobenzene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:50	108-90-7	
Chloroethane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:50	75-00-3	
2-Chloroethylvinyl ether	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:50	110-75-8	
Chloroform	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:50	67-66-3	
Chloromethane	**0.62U**	ug/L	1.0	0.62	1		03/14/11 18:50	74-87-3	
2-Chlorotoluene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:50	95-49-8	
4-Chlorotoluene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:50	106-43-4	
Dibromochloromethane	**0.26U**	ug/L	0.50	0.26	1		03/14/11 18:50	124-48-1	
Dibromomethane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:50	74-95-3	
1,2-Dichlorobenzene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:50	95-50-1	
1,3-Dichlorobenzene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:50	541-73-1	
1,4-Dichlorobenzene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:50	106-46-7	
Dichlorodifluoromethane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:50	75-71-8	
1,1-Dichloroethane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:50	75-34-3	
1,2-Dichloroethane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:50	107-06-2	
1,1-Dichloroethene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:50	75-35-4	
cis-1,2-Dichloroethene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:50	156-59-2	
trans-1,2-Dichloroethene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:50	156-60-5	
1,2-Dichloropropane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:50	78-87-5	
1,3-Dichloropropane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:50	142-28-9	
2,2-Dichloropropane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:50	594-20-7	
1,1-Dichloropropene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:50	563-58-6	
cis-1,3-Dichloropropene	**0.25U**	ug/L	0.50	0.25	1		03/14/11 18:50	10061-01-5	
trans-1,3-Dichloropropene	**0.25U**	ug/L	0.50	0.25	1		03/14/11 18:50	10061-02-6	
Ethylbenzene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:50	100-41-4	
Hexachloro-1,3-butadiene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:50	87-68-3	
Isopropylbenzene (Cumene)	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:50	98-82-8	
p-Isopropyltoluene	**202**	ug/L	10.0	5.0	10		03/15/11 20:38	99-87-6	
Methylene Chloride	**2.5U**	ug/L	5.0	2.5	1		03/14/11 18:50	75-09-2	
4-Methyl-2-pentanone (MIBK)	**5.0U**	ug/L	10.0	5.0	1		03/14/11 18:50	108-10-1	
Methyl-tert-butyl ether	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:50	1634-04-4	L3
Naphthalene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:50	91-20-3	
n-Propylbenzene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:50	103-65-1	

Pace Analytical Services, Inc.
8 East Tower Circle
Ormond Beach, FL 32174
(386)672-5668

ANALYTICAL RESULTS

Project: 8260
Pace Project No.: 3527145

Sample: INSITU 1 **Lab ID: 3527145005** Collected: 03/01/11 15:30 Received: 03/03/11 07:00 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8260 MSV	Analytical Method: EPA 8260								
Styrene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:50	100-42-5	
1,1,1,2-Tetrachloroethane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:50	630-20-6	
1,1,2,2-Tetrachloroethane	**0.18U**	ug/L	0.50	0.18	1		03/14/11 18:50	79-34-5	
Tetrachloroethene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:50	127-18-4	
Toluene	**1.1**	ug/L	1.0	0.50	1		03/14/11 18:50	108-88-3	
1,2,3-Trichlorobenzene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:50	87-61-6	
1,2,4-Trichlorobenzene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:50	120-82-1	
1,1,1-Trichloroethane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:50	71-55-6	
1,1,2-Trichloroethane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:50	79-00-5	
Trichloroethene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:50	79-01-6	
Trichlorofluoromethane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:50	75-69-4	
1,2,3-Trichloropropane	**0.36U**	ug/L	0.50	0.36	1		03/14/11 18:50	96-18-4	
1,1,2-Trichlorotrifluoroethane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:50	76-13-1	
1,2,4-Trimethylbenzene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:50	95-63-6	
1,3,5-Trimethylbenzene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:50	108-67-8	
Vinyl chloride	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:50	75-01-4	
Xylene (Total)	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:50	1330-20-7	
m&p-Xylene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:50	179601-23-1	
o-Xylene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 18:50	95-47-6	
4-Bromofluorobenzene (S)	98	%	70-114		1		03/14/11 18:50	460-00-4	
Dibromofluoromethane (S)	98	%	88-117		1		03/14/11 18:50	1868-53-7	
1,2-Dichloroethane-d4 (S)	102	%	86-125		1		03/14/11 18:50	17060-07-0	
Toluene-d8 (S)	99	%	87-113		1		03/14/11 18:50	2037-26-5	

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ANALYTICAL RESULTS

Project: 8260
Pace Project No.: 3527145

Sample: INSITU 3 **Lab ID: 3527145006** Collected: 03/01/11 15:30 Received: 03/03/11 07:00 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8260 MSV	Analytical Method: EPA 8260								
Acetone	**46.7**	ug/L	10.0	5.0	1		03/14/11 17:39	67-64-1	
Benzene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:39	71-43-2	
Bromobenzene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:39	108-86-1	
Bromochloromethane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:39	74-97-5	
Bromodichloromethane	**0.27U**	ug/L	0.60	0.27	1		03/14/11 17:39	75-27-4	
Bromoform	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:39	75-25-2	
Bromomethane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:39	74-83-9	
2-Butanone (MEK)	**30.9**	ug/L	10.0	5.0	1		03/14/11 17:39	78-93-3	
n-Butylbenzene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:39	104-51-8	
sec-Butylbenzene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:39	135-98-8	
tert-Butylbenzene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:39	98-06-6	
Carbon disulfide	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:39	75-15-0	
Carbon tetrachloride	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:39	56-23-5	
Chlorobenzene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:39	108-90-7	
Chloroethane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:39	75-00-3	
2-Chloroethylvinyl ether	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:39	110-75-8	
Chloroform	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:39	67-66-3	
Chloromethane	**0.62U**	ug/L	1.0	0.62	1		03/14/11 17:39	74-87-3	
2-Chlorotoluene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:39	95-49-8	
4-Chlorotoluene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:39	106-43-4	
Dibromochloromethane	**0.26U**	ug/L	0.50	0.26	1		03/14/11 17:39	124-48-1	
Dibromomethane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:39	74-95-3	
1,2-Dichlorobenzene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:39	95-50-1	
1,3-Dichlorobenzene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:39	541-73-1	
1,4-Dichlorobenzene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:39	106-46-7	
Dichlorodifluoromethane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:39	75-71-8	
1,1-Dichloroethane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:39	75-34-3	
1,2-Dichloroethane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:39	107-06-2	
1,1-Dichloroethene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:39	75-35-4	
cis-1,2-Dichloroethene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:39	156-59-2	
trans-1,2-Dichloroethene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:39	156-60-5	
1,2-Dichloropropane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:39	78-87-5	
1,3-Dichloropropane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:39	142-28-9	
2,2-Dichloropropane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:39	594-20-7	
1,1-Dichloropropene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:39	563-58-6	
cis-1,3-Dichloropropene	**0.25U**	ug/L	0.50	0.25	1		03/14/11 17:39	10061-01-5	
trans-1,3-Dichloropropene	**0.25U**	ug/L	0.50	0.25	1		03/14/11 17:39	10061-02-6	
Ethylbenzene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:39	100-41-4	
Hexachloro-1,3-butadiene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:39	87-68-3	
Isopropylbenzene (Cumene)	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:39	98-82-8	
p-Isopropyltoluene	**13.3**	ug/L	1.0	0.50	1		03/14/11 17:39	99-87-6	
Methylene Chloride	**2.5U**	ug/L	5.0	2.5	1		03/14/11 17:39	75-09-2	
4-Methyl-2-pentanone (MIBK)	**5.0U**	ug/L	10.0	5.0	1		03/14/11 17:39	108-10-1	
Methyl-tert-butyl ether	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:39	1634-04-4	
Naphthalene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:39	91-20-3	
n-Propylbenzene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:39	103-65-1	

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ANALYTICAL RESULTS

Project: 8260
Pace Project No.: 3527145

Sample: INSITU 3 **Lab ID: 3527145006** Collected: 03/01/11 15:30 Received: 03/03/11 07:00 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8260 MSV	Analytical Method: EPA 8260								
Styrene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:39	100-42-5	
1,1,1,2-Tetrachloroethane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:39	630-20-6	
1,1,2,2-Tetrachloroethane	**0.18U**	ug/L	0.50	0.18	1		03/14/11 17:39	79-34-5	
Tetrachloroethene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:39	127-18-4	
Toluene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:39	108-88-3	
1,2,3-Trichlorobenzene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:39	87-61-6	
1,2,4-Trichlorobenzene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:39	120-82-1	
1,1,1-Trichloroethane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:39	71-55-6	
1,1,2-Trichloroethane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:39	79-00-5	
Trichloroethene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:39	79-01-6	
Trichlorofluoromethane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:39	75-69-4	
1,2,3-Trichloropropane	**0.36U**	ug/L	0.50	0.36	1		03/14/11 17:39	96-18-4	
1,1,2-Trichlorotrifluoroethane	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:39	76-13-1	
1,2,4-Trimethylbenzene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:39	95-63-6	
1,3,5-Trimethylbenzene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:39	108-67-8	
Vinyl chloride	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:39	75-01-4	
Xylene (Total)	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:39	1330-20-7	
m&p-Xylene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:39	179601-23-1	
o-Xylene	**0.50U**	ug/L	1.0	0.50	1		03/14/11 17:39	95-47-6	
4-Bromofluorobenzene (S)	111	%	70-114		1		03/14/11 17:39	460-00-4	
Dibromofluoromethane (S)	98	%	88-117		1		03/14/11 17:39	1868-53-7	
1,2-Dichloroethane-d4 (S)	97	%	86-125		1		03/14/11 17:39	17060-07-0	
Toluene-d8 (S)	105	%	87-113		1		03/14/11 17:39	2037-26-5	

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QUALITY CONTROL DATA

Project: 8260
Pace Project No.: 3527145

QC Batch: MSV/2817 Analysis Method: EPA 8260
QC Batch Method: EPA 8260 Analysis Description: 8260 MSV
Associated Lab Samples: 3527145001, 3527145002, 3527145003, 3527145004, 3527145005

METHOD BLANK: 180771 Matrix: Water
Associated Lab Samples: 3527145001, 3527145002, 3527145003, 3527145004, 3527145005

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
1,1,1,2-Tetrachloroethane	ug/L	0.50U	1.0	03/14/11 10:42	
1,1,1-Trichloroethane	ug/L	0.50U	1.0	03/14/11 10:42	
1,1,2,2-Tetrachloroethane	ug/L	0.18U	0.50	03/14/11 10:42	
1,1,2-Trichloroethane	ug/L	0.50U	1.0	03/14/11 10:42	
1,1,2-Trichlorotrifluoroethane	ug/L	0.50U	1.0	03/14/11 10:42	
1,1-Dichloroethane	ug/L	0.50U	1.0	03/14/11 10:42	
1,1-Dichloroethene	ug/L	0.50U	1.0	03/14/11 10:42	
1,1-Dichloropropene	ug/L	0.50U	1.0	03/14/11 10:42	
1,2,3-Trichlorobenzene	ug/L	0.50U	1.0	03/14/11 10:42	
1,2,3-Trichloropropane	ug/L	0.36U	0.50	03/14/11 10:42	
1,2,4-Trichlorobenzene	ug/L	0.50U	1.0	03/14/11 10:42	
1,2,4-Trimethylbenzene	ug/L	0.50U	1.0	03/14/11 10:42	
1,2-Dichlorobenzene	ug/L	0.50U	1.0	03/14/11 10:42	
1,2-Dichloroethane	ug/L	0.50U	1.0	03/14/11 10:42	
1,2-Dichloropropane	ug/L	0.50U	1.0	03/14/11 10:42	
1,3,5-Trimethylbenzene	ug/L	0.50U	1.0	03/14/11 10:42	
1,3-Dichlorobenzene	ug/L	0.50U	1.0	03/14/11 10:42	
1,3-Dichloropropane	ug/L	0.50U	1.0	03/14/11 10:42	
1,4-Dichlorobenzene	ug/L	0.50U	1.0	03/14/11 10:42	
2,2-Dichloropropane	ug/L	0.50U	1.0	03/14/11 10:42	
2-Butanone (MEK)	ug/L	5.0U	10.0	03/14/11 10:42	
2-Chloroethylvinyl ether	ug/L	0.50U	1.0	03/14/11 10:42	
2-Chlorotoluene	ug/L	0.50U	1.0	03/14/11 10:42	
4-Chlorotoluene	ug/L	0.50U	1.0	03/14/11 10:42	
4-Methyl-2-pentanone (MIBK)	ug/L	5.0U	10.0	03/14/11 10:42	
Acetone	ug/L	5.0U	10.0	03/14/11 10:42	
Benzene	ug/L	0.50U	1.0	03/14/11 10:42	
Bromobenzene	ug/L	0.50U	1.0	03/14/11 10:42	
Bromochloromethane	ug/L	0.50U	1.0	03/14/11 10:42	
Bromodichloromethane	ug/L	0.27U	0.60	03/14/11 10:42	
Bromoform	ug/L	0.50U	1.0	03/14/11 10:42	
Bromomethane	ug/L	0.50U	1.0	03/14/11 10:42	
Carbon disulfide	ug/L	0.85 I	1.0	03/14/11 10:42	
Carbon tetrachloride	ug/L	0.50U	1.0	03/14/11 10:42	
Chlorobenzene	ug/L	0.50U	1.0	03/14/11 10:42	
Chloroethane	ug/L	0.50U	1.0	03/14/11 10:42	
Chloroform	ug/L	0.50U	1.0	03/14/11 10:42	
Chloromethane	ug/L	0.62U	1.0	03/14/11 10:42	
cis-1,2-Dichloroethene	ug/L	0.50U	1.0	03/14/11 10:42	
cis-1,3-Dichloropropene	ug/L	0.25U	0.50	03/14/11 10:42	
Dibromochloromethane	ug/L	0.26U	0.50	03/14/11 10:42	
Dibromomethane	ug/L	0.50U	1.0	03/14/11 10:42	
Dichlorodifluoromethane	ug/L	0.50U	1.0	03/14/11 10:42	

Pace Analytical Services, Inc.
8 East Tower Circle
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QUALITY CONTROL DATA

Project: 8260
Pace Project No.: 3527145

METHOD BLANK: 180771 Matrix: Water

Associated Lab Samples: 3527145001, 3527145002, 3527145003, 3527145004, 3527145005

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Ethylbenzene	ug/L	0.50U	1.0	03/14/11 10:42	
Hexachloro-1,3-butadiene	ug/L	0.50U	1.0	03/14/11 10:42	
Isopropylbenzene (Cumene)	ug/L	0.50U	1.0	03/14/11 10:42	
m&p-Xylene	ug/L	0.50U	1.0	03/14/11 10:42	
Methyl-tert-butyl ether	ug/L	0.50U	1.0	03/14/11 10:42	
Methylene Chloride	ug/L	2.5U	5.0	03/14/11 10:42	
n-Butylbenzene	ug/L	0.50U	1.0	03/14/11 10:42	
n-Propylbenzene	ug/L	0.50U	1.0	03/14/11 10:42	
Naphthalene	ug/L	0.50U	1.0	03/14/11 10:42	
o-Xylene	ug/L	0.50U	1.0	03/14/11 10:42	
p-Isopropyltoluene	ug/L	0.50U	1.0	03/14/11 10:42	
sec-Butylbenzene	ug/L	0.50U	1.0	03/14/11 10:42	
Styrene	ug/L	0.50U	1.0	03/14/11 10:42	
tert-Butylbenzene	ug/L	0.50U	1.0	03/14/11 10:42	
Tetrachloroethene	ug/L	0.50U	1.0	03/14/11 10:42	
Toluene	ug/L	0.50U	1.0	03/14/11 10:42	
trans-1,2-Dichloroethene	ug/L	0.50U	1.0	03/14/11 10:42	
trans-1,3-Dichloropropene	ug/L	0.25U	0.50	03/14/11 10:42	
Trichloroethene	ug/L	0.50U	1.0	03/14/11 10:42	
Trichlorofluoromethane	ug/L	0.50U	1.0	03/14/11 10:42	
Vinyl chloride	ug/L	0.50U	1.0	03/14/11 10:42	
Xylene (Total)	ug/L	0.50U	1.0	03/14/11 10:42	
1,2-Dichloroethane-d4 (S)	%	102	86-125	03/14/11 10:42	
4-Bromofluorobenzene (S)	%	102	70-114	03/14/11 10:42	
Dibromofluoromethane (S)	%	97	88-117	03/14/11 10:42	
Toluene-d8 (S)	%	99	87-113	03/14/11 10:42	

LABORATORY CONTROL SAMPLE: 180772

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
1,1,1,2-Tetrachloroethane	ug/L	20	19.3	97	80-123	
1,1,1-Trichloroethane	ug/L	20	20.6	103	80-120	
1,1,2,2-Tetrachloroethane	ug/L	20	20.1	100	72-127	
1,1,2-Trichloroethane	ug/L	20	18.8	94	80-121	
1,1,2-Trichlorotrifluoroethane	ug/L	20	25.3	127	73-128	
1,1-Dichloroethane	ug/L	20	20.1	100	80-122	
1,1-Dichloroethene	ug/L	20	20.4	102	74-114	
1,1-Dichloropropene	ug/L	20	20.7	103	80-122	
1,2,3-Trichlorobenzene	ug/L	20	18.3	92	76-137	
1,2,3-Trichloropropane	ug/L	20	16.7	84	73-123	
1,2,4-Trichlorobenzene	ug/L	20	18.5	92	78-129	
1,2,4-Trimethylbenzene	ug/L	20	19.1	95	80-121	
1,2-Dichlorobenzene	ug/L	20	18.6	93	80-120	
1,2-Dichloroethane	ug/L	20	20.6	103	80-120	
1,2-Dichloropropane	ug/L	20	19.7	98	80-120	

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QUALITY CONTROL DATA

Project: 8260
Pace Project No.: 3527145

LABORATORY CONTROL SAMPLE: 180772

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
1,3,5-Trimethylbenzene	ug/L	20	19.2	96	80-120	
1,3-Dichlorobenzene	ug/L	20	18.7	94	80-120	
1,3-Dichloropropane	ug/L	20	19.3	97	80-120	
1,4-Dichlorobenzene	ug/L	20	18.5	92	83-120	
2,2-Dichloropropane	ug/L	20	22.6	113	72-131	
2-Butanone (MEK)	ug/L	20	22.2	111	55-167	
2-Chloroethylvinyl ether	ug/L	20	19.7	98	77-123	
2-Chlorotoluene	ug/L	20	18.8	94	79-120	
4-Chlorotoluene	ug/L	20	18.1	91	79-120	
4-Methyl-2-pentanone (MIBK)	ug/L	20	19.8	99	75-122	
Acetone	ug/L	20	27.9	139	40-150	
Benzene	ug/L	20	19.4	97	80-123	
Bromobenzene	ug/L	20	18.5	92	76-121	
Bromochloromethane	ug/L	20	19.9	99	80-120	
Bromodichloromethane	ug/L	20	21.9	110	80-123	
Bromoform	ug/L	20	17.7	89	68-121	
Bromomethane	ug/L	20	23.3	117	38-179	
Carbon disulfide	ug/L	20	30.8	154	51-155	
Carbon tetrachloride	ug/L	20	18.4	92	79-122	
Chlorobenzene	ug/L	20	18.6	93	80-120	
Chloroethane	ug/L	20	19.3	96	59-149	
Chloroform	ug/L	20	19.0	95	79-120	
Chloromethane	ug/L	20	21.6	108	68-140	
cis-1,2-Dichloroethene	ug/L	20	19.5	97	80-120	
cis-1,3-Dichloropropene	ug/L	20	23.3	116	80-126	
Dibromochloromethane	ug/L	20	18.0	90	76-122	
Dibromomethane	ug/L	20	19.3	96	81-122	
Dichlorodifluoromethane	ug/L	20	19.2	96	67-127	
Ethylbenzene	ug/L	20	18.9	95	80-120	
Hexachloro-1,3-butadiene	ug/L	20	18.6	93	75-127	
Isopropylbenzene (Cumene)	ug/L	20	18.6	93	80-123	
m&p-Xylene	ug/L	40	37.4	93		
Methyl-tert-butyl ether	ug/L	20	27.7	138	74-125	1p,J(L0)
Methylene Chloride	ug/L	20	19.7	99	75-127	
n-Butylbenzene	ug/L	20	19.6	98	80-126	
n-Propylbenzene	ug/L	20	18.6	93	79-122	
Naphthalene	ug/L	20	18.9	94	75-141	
o-Xylene	ug/L	20	19.1	95		
p-Isopropyltoluene	ug/L	20	19.1	95	80-123	
sec-Butylbenzene	ug/L	20	19.2	96	80-124	
Styrene	ug/L	20	18.8	94	80-122	
tert-Butylbenzene	ug/L	20	18.9	95	80-121	
Tetrachloroethene	ug/L	20	16.3	82	66-133	
Toluene	ug/L	20	19.0	95	80-117	
trans-1,2-Dichloroethene	ug/L	20	20.5	102	80-122	
trans-1,3-Dichloropropene	ug/L	20	19.0	95	80-122	
Trichloroethene	ug/L	20	18.8	94	80-120	
Trichlorofluoromethane	ug/L	20	19.5	98	72-131	

Pace Analytical Services, Inc.
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QUALITY CONTROL DATA

Project: 8260
Pace Project No.: 3527145

LABORATORY CONTROL SAMPLE: 180772

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Vinyl chloride	ug/L	20	19.6	98	69-140	
Xylene (Total)	ug/L	60	56.5	94	80-120	
1,2-Dichloroethane-d4 (S)	%			99	86-125	
4-Bromofluorobenzene (S)	%			101	70-114	
Dibromofluoromethane (S)	%			102	88-117	
Toluene-d8 (S)	%			102	87-113	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 180773 180774

Parameter	Units	3527294002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
1,1,1,2-Tetrachloroethane	ug/L	0.50U	20	20	17.5	14.2	88	71	70-130	21	40	
1,1,1-Trichloroethane	ug/L	0.50U	20	20	20.2	15.8	101	79	70-130	24	40	
1,1,2,2-Tetrachloroethane	ug/L	0.18U	20	20	19.1	15.9	95	79	70-130	18	40	
1,1,2-Trichloroethane	ug/L	0.50U	20	20	17.7	14.9	89	75	70-130	17	40	
1,1,2-Trichlorotrifluoroethane	ug/L	0.50U	20	20	27.0	14.5	135	72	70-130	60	40	J(D6), J(M1)
1,1-Dichloroethane	ug/L	0.50U	20	20	19.7	16.9	99	84	70-130	15	40	
1,1-Dichloroethene	ug/L	0.50U	20	20	21.6	16.5	108	83	70-130	27	40	
1,1-Dichloropropene	ug/L	0.50U	20	20	21.0	15.3	105	76	70-130	32	40	
1,2,3-Trichlorobenzene	ug/L	0.50U	20	20	16.2	11.4	81	57	70-130	35	40	J(M1)
1,2,3-Trichloropropane	ug/L	0.36U	20	20	21.6	17.9	108	90	70-130	19	40	
1,2,4-Trichlorobenzene	ug/L	0.50U	20	20	16.6	10.9	83	55	70-130	41	40	J(D6), J(M1)
1,2,4-Trimethylbenzene	ug/L	0.50U	20	20	18.7	13.3	93	67	70-130	34	40	J(M1)
1,2-Dichlorobenzene	ug/L	0.50U	20	20	17.6	13.6	88	68	70-130	26	40	J(M1)
1,2-Dichloroethane	ug/L	0.50U	20	20	19.4	16.7	97	84	70-130	15	40	
1,2-Dichloropropane	ug/L	0.50U	20	20	19.0	16.2	95	81	70-130	16	40	
1,3,5-Trimethylbenzene	ug/L	0.50U	20	20	18.9	13.1	94	65	70-130	36	40	J(M1)
1,3-Dichlorobenzene	ug/L	0.50U	20	20	17.8	13.1	89	66	70-130	30	40	J(M1)
1,3-Dichloropropane	ug/L	0.50U	20	20	18.0	15.1	90	76	70-130	17	40	
1,4-Dichlorobenzene	ug/L	0.50U	20	20	17.7	12.8	89	64	70-130	32	40	J(M1)
2,2-Dichloropropane	ug/L	0.50U	20	20	21.1	16.8	106	84	70-130	23	40	
2-Butanone (MEK)	ug/L	5.0U	20	20	17.8	13.4	89	67	70-130	29	40	J(M1)
2-Chloroethylvinyl ether	ug/L	0.50U	20	20	0.50U	0.50U	0	0	70-130		40	J(M1)
2-Chlorotoluene	ug/L	0.50U	20	20	18.9	13.8	94	69	70-130	31	40	J(M1)
4-Chlorotoluene	ug/L	0.50U	20	20	18.0	13.3	90	67	70-130	30	40	J(M1)
4-Methyl-2-pentanone (MIBK)	ug/L	5.0U	20	20	19.5	14.5	98	72	70-130	30	40	
Acetone	ug/L	5.0U	20	20	17.4	14.3	87	72	70-130	20	40	
Benzene	ug/L	0.50U	20	20	19.1	15.9	95	80	70-130	18	40	
Bromobenzene	ug/L	0.50U	20	20	18.4	14.1	92	71	70-130	26	40	
Bromochloromethane	ug/L	0.50U	20	20	19.1	15.6	96	78	70-130	20	40	
Bromodichloromethane	ug/L	0.27U	20	20	20.5	16.9	103	85	70-130	19	40	
Bromoform	ug/L	0.50U	20	20	14.4	12.0	72	60	70-130	18	40	J(M1)
Bromomethane	ug/L	0.50U	20	20	17.5	15.0	88	75	70-130	16	40	
Carbon disulfide	ug/L	0.72 I	20	20	35.0	24.8	171	120	70-130	34	40	J(M1)
Carbon tetrachloride	ug/L	0.50U	20	20	18.1	13.6	90	68	70-130	28	40	J(M1)

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QUALITY CONTROL DATA

Project: 8260
Pace Project No.: 3527145

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 180773 180774

Parameter	Units	3527294002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chlorobenzene	ug/L	0.50U	20	20	17.5	13.9	88	70	70-130	23	40	
Chloroethane	ug/L	0.50U	20	20	22.3	17.1	111	86	70-130	26	40	
Chloroform	ug/L	0.50U	20	20	19.3	16.0	96	80	70-130	19	40	
Chloromethane	ug/L	0.62U	20	20	20.6	15.7	103	78	70-130	27	40	
cis-1,2-Dichloroethene	ug/L	0.50U	20	20	18.9	16.3	95	81	70-130	15	40	
cis-1,3-Dichloropropene	ug/L	0.25U	20	20	20.8	17.3	104	86	70-130	19	40	
Dibromochloromethane	ug/L	0.26U	20	20	16.0	13.1	80	66	70-130	20	40	J(M1)
Dibromomethane	ug/L	0.50U	20	20	17.4	14.8	87	74	70-130	16	40	
Dichlorodifluoromethane	ug/L	0.50U	20	20	23.5	12.6	117	63	70-130	60	40	J(D6), J(M1)
Ethylbenzene	ug/L	0.50U	20	20	18.3	13.3	91	67	70-130	32	40	J(M1)
Hexachloro-1,3-butadiene	ug/L	0.50U	20	20	16.5	9.3	82	47	70-130	55	40	J(D6), J(M1)
Isopropylbenzene (Cumene)	ug/L	0.50U	20	20	18.1	12.4	90	62	70-130	37	40	J(M1)
m&p-Xylene	ug/L	0.50U	40	40	36.1	26.1	90	65		32		
Methyl-tert-butyl ether	ug/L	0.50U	20	20	24.6	19.9	123	99	70-130	21	40	
Methylene Chloride	ug/L	2.5U	20	20	18.9	16.4	94	82	70-130	14	40	
n-Butylbenzene	ug/L	0.50U	20	20	19.2	11.2	96	56	70-130	53	40	J(D6), J(M1)
n-Propylbenzene	ug/L	0.50U	20	20	19.0	12.5	95	62	70-130	42	40	J(D6), J(M1)
Naphthalene	ug/L	0.50U	20	20	17.4	13.0	87	65	70-130	29	40	J(M1)
o-Xylene	ug/L	0.50U	20	20	18.2	13.9	91	70		27		
p-Isopropyltoluene	ug/L	0.50U	20	20	18.9	11.9	94	59	70-130	45	40	J(D6), J(M1)
sec-Butylbenzene	ug/L	0.50U	20	20	19.5	12.0	97	60	70-130	48	40	J(D6), J(M1)
Styrene	ug/L	0.50U	20	20	17.5	13.7	88	68	70-130	25	40	J(M1)
tert-Butylbenzene	ug/L	0.50U	20	20	18.8	12.7	94	63	70-130	39	40	J(M1)
Tetrachloroethene	ug/L	0.50U	20	20	14.7	9.9	74	49	70-130	40	40	J(M1)
Toluene	ug/L	0.50U	20	20	18.1	14.2	91	71	70-130	24	40	
trans-1,2-Dichloroethene	ug/L	0.50U	20	20	20.3	16.6	102	83	70-130	20	40	
trans-1,3-Dichloropropene	ug/L	0.25U	20	20	16.3	13.4	81	67	70-130	19	40	J(M1)
Trichloroethene	ug/L	0.50U	20	20	18.8	14.8	94	74	70-130	23	40	
Trichlorofluoromethane	ug/L	0.50U	20	20	23.5	14.1	118	71	70-130	50	40	J(D6)
Vinyl chloride	ug/L	0.50U	20	20	22.9	17.0	115	85	70-130	30	40	
Xylene (Total)	ug/L	0.50U	60	60	54.3	40.0	91	67	70-130	30	40	
1,2-Dichloroethane-d4 (S)	%						95	103	86-125			
4-Bromofluorobenzene (S)	%						97	97	70-114			
Dibromofluoromethane (S)	%						103	101	88-117			
Toluene-d8 (S)	%						103	101	87-113			

Pace Analytical Services, Inc.
8 East Tower Circle
Ormond Beach, FL 32174
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QUALITY CONTROL DATA

Project: 8260
Pace Project No.: 3527145

QC Batch: MSV/2818 Analysis Method: EPA 8260
QC Batch Method: EPA 8260 Analysis Description: 8260 MSV
Associated Lab Samples: 3527145006

METHOD BLANK: 180781 Matrix: Water
Associated Lab Samples: 3527145006

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
1,1,1,2-Tetrachloroethane	ug/L	0.50U	1.0	03/14/11 10:44	
1,1,1-Trichloroethane	ug/L	0.50U	1.0	03/14/11 10:44	
1,1,2,2-Tetrachloroethane	ug/L	0.18U	0.50	03/14/11 10:44	
1,1,2-Trichloroethane	ug/L	0.50U	1.0	03/14/11 10:44	
1,1,2-Trichlorotrifluoroethane	ug/L	0.50U	1.0	03/14/11 10:44	
1,1-Dichloroethane	ug/L	0.50U	1.0	03/14/11 10:44	
1,1-Dichloroethene	ug/L	0.50U	1.0	03/14/11 10:44	
1,1-Dichloropropene	ug/L	0.50U	1.0	03/14/11 10:44	
1,2,3-Trichlorobenzene	ug/L	0.50U	1.0	03/14/11 10:44	
1,2,3-Trichloropropane	ug/L	0.36U	0.50	03/14/11 10:44	
1,2,4-Trichlorobenzene	ug/L	0.50U	1.0	03/14/11 10:44	
1,2,4-Trimethylbenzene	ug/L	0.50U	1.0	03/14/11 10:44	
1,2-Dichlorobenzene	ug/L	0.50U	1.0	03/14/11 10:44	
1,2-Dichloroethane	ug/L	0.50U	1.0	03/14/11 10:44	
1,2-Dichloropropane	ug/L	0.50U	1.0	03/14/11 10:44	
1,3,5-Trimethylbenzene	ug/L	0.50U	1.0	03/14/11 10:44	
1,3-Dichlorobenzene	ug/L	0.50U	1.0	03/14/11 10:44	
1,3-Dichloropropane	ug/L	0.50U	1.0	03/14/11 10:44	
1,4-Dichlorobenzene	ug/L	0.50U	1.0	03/14/11 10:44	
2,2-Dichloropropane	ug/L	0.50U	1.0	03/14/11 10:44	
2-Butanone (MEK)	ug/L	5.0U	10.0	03/14/11 10:44	
2-Chloroethylvinyl ether	ug/L	0.50U	1.0	03/14/11 10:44	
2-Chlorotoluene	ug/L	0.50U	1.0	03/14/11 10:44	
4-Chlorotoluene	ug/L	0.50U	1.0	03/14/11 10:44	
4-Methyl-2-pentanone (MIBK)	ug/L	5.0U	10.0	03/14/11 10:44	
Acetone	ug/L	5.0U	10.0	03/14/11 10:44	
Benzene	ug/L	0.50U	1.0	03/14/11 10:44	
Bromobenzene	ug/L	0.50U	1.0	03/14/11 10:44	
Bromochloromethane	ug/L	0.50U	1.0	03/14/11 10:44	
Bromodichloromethane	ug/L	0.27U	0.60	03/14/11 10:44	
Bromoform	ug/L	0.50U	1.0	03/14/11 10:44	
Bromomethane	ug/L	0.50U	1.0	03/14/11 10:44	
Carbon disulfide	ug/L	0.50U	1.0	03/14/11 10:44	
Carbon tetrachloride	ug/L	0.50U	1.0	03/14/11 10:44	
Chlorobenzene	ug/L	0.50U	1.0	03/14/11 10:44	
Chloroethane	ug/L	0.50U	1.0	03/14/11 10:44	
Chloroform	ug/L	0.50U	1.0	03/14/11 10:44	
Chloromethane	ug/L	0.62U	1.0	03/14/11 10:44	
cis-1,2-Dichloroethene	ug/L	0.50U	1.0	03/14/11 10:44	
cis-1,3-Dichloropropene	ug/L	0.25U	0.50	03/14/11 10:44	
Dibromochloromethane	ug/L	0.26U	0.50	03/14/11 10:44	
Dibromomethane	ug/L	0.50U	1.0	03/14/11 10:44	
Dichlorodifluoromethane	ug/L	0.50U	1.0	03/14/11 10:44	

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QUALITY CONTROL DATA

Project: 8260
Pace Project No.: 3527145

METHOD BLANK: 180781 Matrix: Water

Associated Lab Samples: 3527145006

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Ethylbenzene	ug/L	0.50U	1.0	03/14/11 10:44	
Hexachloro-1,3-butadiene	ug/L	0.50U	1.0	03/14/11 10:44	
Isopropylbenzene (Cumene)	ug/L	0.50U	1.0	03/14/11 10:44	
m&p-Xylene	ug/L	0.50U	1.0	03/14/11 10:44	
Methyl-tert-butyl ether	ug/L	0.50U	1.0	03/14/11 10:44	
Methylene Chloride	ug/L	2.5U	5.0	03/14/11 10:44	
n-Butylbenzene	ug/L	0.50U	1.0	03/14/11 10:44	
n-Propylbenzene	ug/L	0.50U	1.0	03/14/11 10:44	
Naphthalene	ug/L	0.50U	1.0	03/14/11 10:44	
o-Xylene	ug/L	0.50U	1.0	03/14/11 10:44	
p-Isopropyltoluene	ug/L	0.50U	1.0	03/14/11 10:44	
sec-Butylbenzene	ug/L	0.50U	1.0	03/14/11 10:44	
Styrene	ug/L	0.50U	1.0	03/14/11 10:44	
tert-Butylbenzene	ug/L	0.50U	1.0	03/14/11 10:44	
Tetrachloroethene	ug/L	0.50U	1.0	03/14/11 10:44	
Toluene	ug/L	0.50U	1.0	03/14/11 10:44	
trans-1,2-Dichloroethene	ug/L	0.50U	1.0	03/14/11 10:44	
trans-1,3-Dichloropropene	ug/L	0.25U	0.50	03/14/11 10:44	
Trichloroethene	ug/L	0.50U	1.0	03/14/11 10:44	
Trichlorofluoromethane	ug/L	0.50U	1.0	03/14/11 10:44	
Vinyl chloride	ug/L	0.50U	1.0	03/14/11 10:44	
Xylene (Total)	ug/L	0.50U	1.0	03/14/11 10:44	
1,2-Dichloroethane-d4 (S)	%	92	86-125	03/14/11 10:44	
4-Bromofluorobenzene (S)	%	112	70-114	03/14/11 10:44	
Dibromofluoromethane (S)	%	94	88-117	03/14/11 10:44	
Toluene-d8 (S)	%	103	87-113	03/14/11 10:44	

LABORATORY CONTROL SAMPLE: 180782

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
1,1,1,2-Tetrachloroethane	ug/L	20	19.6	98	80-123	
1,1,1-Trichloroethane	ug/L	20	19.2	96	80-120	
1,1,2,2-Tetrachloroethane	ug/L	20	19.3	97	72-127	
1,1,2-Trichloroethane	ug/L	20	19.0	95	80-121	
1,1,2-Trichlorotrifluoroethane	ug/L	20	19.4	97	73-128	
1,1-Dichloroethane	ug/L	20	17.5	87	80-122	
1,1-Dichloroethene	ug/L	20	15.9	80	74-114	
1,1-Dichloropropene	ug/L	20	18.6	93	80-122	
1,2,3-Trichlorobenzene	ug/L	20	18.2	91	76-137	
1,2,3-Trichloropropane	ug/L	20	17.1	86	73-123	
1,2,4-Trichlorobenzene	ug/L	20	18.4	92	78-129	
1,2,4-Trimethylbenzene	ug/L	20	17.1	85	80-121	
1,2-Dichlorobenzene	ug/L	20	18.5	92	80-120	
1,2-Dichloroethane	ug/L	20	18.9	95	80-120	
1,2-Dichloropropane	ug/L	20	16.9	85	80-120	

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QUALITY CONTROL DATA

Project: 8260
Pace Project No.: 3527145

LABORATORY CONTROL SAMPLE: 180782

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
1,3,5-Trimethylbenzene	ug/L	20	19.4	97	80-120	
1,3-Dichlorobenzene	ug/L	20	18.5	93	80-120	
1,3-Dichloropropane	ug/L	20	20.2	101	80-120	
1,4-Dichlorobenzene	ug/L	20	17.6	88	83-120	
2,2-Dichloropropane	ug/L	20	18.1	90	72-131	
2-Butanone (MEK)	ug/L	20	18.0	90	55-167	
2-Chloroethylvinyl ether	ug/L	20	17.6	88	77-123	
2-Chlorotoluene	ug/L	20	17.9	90	79-120	
4-Chlorotoluene	ug/L	20	17.1	86	79-120	
4-Methyl-2-pentanone (MIBK)	ug/L	20	17.2	86	75-122	
Acetone	ug/L	20	22.0	110	40-150	
Benzene	ug/L	20	18.6	93	80-123	
Bromobenzene	ug/L	20	17.3	86	76-121	
Bromochloromethane	ug/L	20	19.2	96	80-120	
Bromodichloromethane	ug/L	20	16.7	83	80-123	
Bromoform	ug/L	20	14.3	71	68-121	
Bromomethane	ug/L	20	16.5	83	38-179	
Carbon disulfide	ug/L	20	21.2	106	51-155	
Carbon tetrachloride	ug/L	20	18.6	93	79-122	
Chlorobenzene	ug/L	20	18.8	94	80-120	
Chloroethane	ug/L	20	16.0	80	59-149	
Chloroform	ug/L	20	17.3	87	79-120	
Chloromethane	ug/L	20	16.9	85	68-140	
cis-1,2-Dichloroethene	ug/L	20	17.3	87	80-120	
cis-1,3-Dichloropropene	ug/L	20	18.9	95	80-126	
Dibromochloromethane	ug/L	20	17.3	86	76-122	
Dibromomethane	ug/L	20	19.9	100	81-122	
Dichlorodifluoromethane	ug/L	20	18.1	91	67-127	
Ethylbenzene	ug/L	20	16.8	84	80-120	
Hexachloro-1,3-butadiene	ug/L	20	18.4	92	75-127	
Isopropylbenzene (Cumene)	ug/L	20	20.0	100	80-123	
m&p-Xylene	ug/L	40	35.7	89		
Methyl-tert-butyl ether	ug/L	20	20.9	105	74-125	
Methylene Chloride	ug/L	20	17.3	87	75-127	
n-Butylbenzene	ug/L	20	19.8	99	80-126	
n-Propylbenzene	ug/L	20	18.6	93	79-122	
Naphthalene	ug/L	20	20.2	101	75-141	
o-Xylene	ug/L	20	19.1	95		
p-Isopropyltoluene	ug/L	20	19.8	99	80-123	
sec-Butylbenzene	ug/L	20	19.2	96	80-124	
Styrene	ug/L	20	16.9	85	80-122	
tert-Butylbenzene	ug/L	20	19.3	96	80-121	
Tetrachloroethene	ug/L	20	17.7	88	66-133	
Toluene	ug/L	20	18.3	92	80-117	
trans-1,2-Dichloroethene	ug/L	20	16.4	82	80-122	
trans-1,3-Dichloropropene	ug/L	20	18.2	91	80-122	
Trichloroethene	ug/L	20	17.2	86	80-120	
Trichlorofluoromethane	ug/L	20	16.5	82	72-131	

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QUALITY CONTROL DATA

Project: 8260
Pace Project No.: 3527145

LABORATORY CONTROL SAMPLE: 180782

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Vinyl chloride	ug/L	20	16.9	85	69-140	
Xylene (Total)	ug/L	60	54.8	91	80-120	
1,2-Dichloroethane-d4 (S)	%			95	86-125	
4-Bromofluorobenzene (S)	%			107	70-114	
Dibromofluoromethane (S)	%			98	88-117	
Toluene-d8 (S)	%			99	87-113	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 180783 180784

Parameter	Units	3527011009 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
1,1,1,2-Tetrachloroethane	ug/L	0.50U	20	20	15.0	17.2	75	86	70-130	13	40	
1,1,1-Trichloroethane	ug/L	0.50U	20	20	18.2	21.6	91	108	70-130	17	40	
1,1,2,2-Tetrachloroethane	ug/L	0.18U	20	20	17.8	19.4	89	97	70-130	8	40	
1,1,2-Trichloroethane	ug/L	0.50U	20	20	17.1	18.6	86	93	70-130	8	40	
1,1,2-Trichlorotrifluoroethane	ug/L	0.50U	20	20	17.0	21.8	85	109	70-130	25	40	
1,1-Dichloroethane	ug/L	0.50U	20	20	17.6	18.8	88	94	70-130	7	40	
1,1-Dichloroethene	ug/L	0.50U	20	20	16.0	18.1	80	90	70-130	12	40	
1,1-Dichloropropene	ug/L	0.50U	20	20	16.8	20.6	84	103	70-130	21	40	
1,2,3-Trichlorobenzene	ug/L	0.50U	20	20	14.5	18.3	72	92	70-130	23	40	
1,2,3-Trichloropropane	ug/L	0.36U	20	20	15.1	16.5	75	82	70-130	9	40	
1,2,4-Trichlorobenzene	ug/L	0.50U	20	20	13.9	18.0	70	90	70-130	26	40	
1,2,4-Trimethylbenzene	ug/L	0.50U	20	20	15.3	17.3	76	87	70-130	13	40	
1,2-Dichlorobenzene	ug/L	0.50U	20	20	15.8	18.5	79	93	70-130	16	40	
1,2-Dichloroethane	ug/L	0.50U	20	20	17.5	18.8	87	94	70-130	7	40	
1,2-Dichloropropane	ug/L	0.50U	20	20	16.4	16.8	82	84	70-130	3	40	
1,3,5-Trimethylbenzene	ug/L	0.50U	20	20	16.8	19.8	84	99	70-130	17	40	
1,3-Dichlorobenzene	ug/L	0.50U	20	20	15.5	19.5	78	97	70-130	23	40	
1,3-Dichloropropane	ug/L	0.50U	20	20	16.9	19.3	85	96	70-130	13	40	
1,4-Dichlorobenzene	ug/L	0.50U	20	20	15.0	18.4	75	92	70-130	20	40	
2,2-Dichloropropane	ug/L	0.50U	20	20	18.0	19.1	90	96	70-130	6	40	
2-Butanone (MEK)	ug/L	5.0U	20	20	15.2	16.8	76	84	70-130	10	40	
2-Chloroethylvinyl ether	ug/L	0.50U	20	20	31.8	32.7	159	163	70-130	3	40	J(M1)
2-Chlorotoluene	ug/L	0.50U	20	20	16.3	18.8	82	94	70-130	14	40	
4-Chlorotoluene	ug/L	0.50U	20	20	14.8	17.8	74	89	70-130	18	40	
4-Methyl-2-pentanone (MIBK)	ug/L	5.0U	20	20	15.2	17.8	76	89	70-130	15	40	
Acetone	ug/L	6.5 I	20	20	21.8	24.3	77	89	70-130	11	40	
Benzene	ug/L	5.1	20	20	23.1	24.9	90	99	70-130	7	40	
Bromobenzene	ug/L	0.50U	20	20	15.5	17.6	77	88	70-130	13	40	
Bromochloromethane	ug/L	0.50U	20	20	18.1	19.4	91	97	70-130	7	40	
Bromodichloromethane	ug/L	0.27U	20	20	15.5	17.4	77	87	70-130	12	40	
Bromoform	ug/L	0.50U	20	20	10.8	12.4	54	62	70-130	14	40	J(M1)
Bromomethane	ug/L	0.50U	20	20	11.0	12.7	55	63	70-130	14	40	J(M1)
Carbon disulfide	ug/L	0.50U	20	20	21.0	23.9	105	120	70-130	13	40	
Carbon tetrachloride	ug/L	0.50U	20	20	16.7	20.5	83	102	70-130	20	40	
Chlorobenzene	ug/L	1.6	20	20	17.3	20.5	79	95	70-130	17	40	
Chloroethane	ug/L	0.50U	20	20	19.3	17.9	97	89	70-130	8	40	

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QUALITY CONTROL DATA

Project: 8260
Pace Project No.: 3527145

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 180783 180784

Parameter	Units	3527011009 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloroform	ug/L	0.50U	20	20	17.7	18.5	88	93	70-130	5	40	
Chloromethane	ug/L	0.62U	20	20	18.2	17.0	91	85	70-130	7	40	
cis-1,2-Dichloroethene	ug/L	0.50U	20	20	17.2	18.3	86	92	70-130	6	40	
cis-1,3-Dichloropropene	ug/L	0.25U	20	20	16.1	17.3	81	87	70-130	7	40	
Dibromochloromethane	ug/L	0.26U	20	20	12.8	15.3	64	77	70-130	18	40	J(M1)
Dibromomethane	ug/L	0.50U	20	20	18.8	20.1	94	100	70-130	6	40	
Dichlorodifluoromethane	ug/L	0.50U	20	20	19.1	23.5	95	118	70-130	21	40	
Ethylbenzene	ug/L	0.50U	20	20	14.9	17.4	74	87	70-130	16	40	
Hexachloro-1,3-butadiene	ug/L	0.50U	20	20	14.5	18.8	72	94	70-130	26	40	
Isopropylbenzene (Cumene)	ug/L	0.50U	20	20	17.3	20.9	85	103	70-130	19	40	
m&p-Xylene	ug/L		40	40	32.0	37.7	72	86		16		
Methyl-tert-butyl ether	ug/L	0.50U	20	20	18.0	19.8	88	97	70-130	9	40	
Methylene Chloride	ug/L	2.5U	20	20	17.9	18.0	87	87	70-130	.5	40	
n-Butylbenzene	ug/L	0.50U	20	20	15.6	21.3	78	106	70-130	31	40	
n-Propylbenzene	ug/L	0.50U	20	20	16.1	19.7	81	99	70-130	20	40	
Naphthalene	ug/L	3.3	20	20	21.8	24.6	92	107	70-130	12	40	
o-Xylene	ug/L		20	20	17.1	20.0	82	96		16		
p-Isopropyltoluene	ug/L	0.50U	20	20	16.8	21.0	84	105	70-130	22	40	
sec-Butylbenzene	ug/L	0.50U	20	20	17.0	20.7	85	104	70-130	20	40	
Styrene	ug/L	0.50U	20	20	14.5	16.2	72	81	70-130	11	40	
tert-Butylbenzene	ug/L	0.50U	20	20	17.7	20.7	89	103	70-130	16	40	
Tetrachloroethene	ug/L	0.50U	20	20	13.5	16.7	68	83	70-130	21	40	J(M1)
Toluene	ug/L	0.62 I	20	20	16.5	19.2	79	93	70-130	15	40	
trans-1,2-Dichloroethene	ug/L	0.50U	20	20	15.8	17.8	79	89	70-130	11	40	
trans-1,3-Dichloropropene	ug/L	0.25U	20	20	14.5	16.1	72	80	70-130	10	40	
Trichloroethene	ug/L	0.50U	20	20	16.1	19.0	81	95	70-130	16	40	
Trichlorofluoromethane	ug/L	0.50U	20	20	17.1	19.2	85	96	70-130	12	40	
Vinyl chloride	ug/L	0.50U	20	20	19.2	20.0	96	100	70-130	4	40	
Xylene (Total)	ug/L	4.0	60	60	49.1	57.8	75	90	70-130	16	40	
1,2-Dichloroethane-d4 (S)	%						100	99	86-125			
4-Bromofluorobenzene (S)	%						102	106	70-114			
Dibromofluoromethane (S)	%						102	102	88-117			
Toluene-d8 (S)	%						102	100	87-113			

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QUALIFIERS

Project: 8260
Pace Project No.: 3527145

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to changes in sample preparation, dilution of the sample aliquot, or moisture content.

ND - Not Detected at or above adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

S - Surrogate

1,2-Diphenylhydrazine (8270 listed analyte) decomposes to Azobenzene.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is NELAP accredited. Contact your Pace PM for the current list of accredited analytes.

LABORATORIES

PASI-O	Pace Analytical Services - Ormond Beach

ANALYTE QUALIFIERS

I	The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit.
1p	The recovery for the LCS was outside method guidance criteria (HIGH) bias. However, the NELAC standards consider the batch in control with up to 4 analytes exceeding the recommended control limits for methods with 71 to 90 analytes in the list.
J(D6)	Estimated Value. The relative percent difference (RPD) between the sample and sample duplicate exceeded laboratory control limits.
J(L0)	Estimated Value. Analyte recovery in the laboratory control sample (LCS) was outside QC limits.
J(M1)	Estimated Value. Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.
L3	Analyte recovery in the laboratory control sample (LCS) exceeded QC limits. Analyte presence below reporting limits in associated samples. Results unaffected by high bias.
V	Indicates that the analyte was detected in both the sample and the associated method blank.

Pace Analytical Services, Inc.
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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 8260
Pace Project No.: 3527145

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
3527145001	**Septic Tank**	EPA 8260	MSV/2817		
3527145002	**ONSAT CL4**	EPA 8260	MSV/2817		
3527145003	**DENTT LS1**	EPA 8260	MSV/2817		
3527145004	**DENTT SU1**	EPA 8260	MSV/2817		
3527145005	**INSITU 1**	EPA 8260	MSV/2817		
3527145006	**INSITU 3**	EPA 8260	MSV/2818		

APPENDIX E

E.P.A. Method 8111 Laboratory Report

Pace Analytical Services, Inc.
8 East Tower Circle
Ormond Beach, FL 32174
(386)672-5668

February 24, 2011

Dr. Daniel Smith
Applied Environmental Technolo
10809 Cedar Cove Drive
Thonotosassa, FL 33592

RE: Project: Stormwater Research
Pace Project No.: 3526611

Dear Dr. Smith:
Enclosed are the analytical results for sample(s) received by the laboratory on February 18, 2011. The results relate only to the samples included in this report. Results reported herein conform to the most current NELAC standards, where applicable, unless otherwise narrated in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Sakina Mckenzie

sakina.mckenzie@pacelabs.com
Project Manager

Enclosures

Pace Analytical Services, Inc.
8 East Tower Circle
Ormond Beach, FL 32174
(386)672-5668

CERTIFICATIONS

Project: Stormwater Research
Pace Project No.: 3526611

Ormond Beach Certification IDs

8 East Tower Circle, Ormond Beach, FL 32174
Alabama Certification #: 41320
Arizona Certification #: AZ0735
Colorado Certification: FL NELAC Reciprocity
Connecticut Certification #: PH 0216
Florida Certification #: E83079
Georgia Certification #: 955
Guam Certification: FL NELAC Reciprocity
Hawaii Certification: FL NELAC Reciprocity
Kansas Certification #: E-10383
Kentucky Certification #: 90050
Louisiana Certification #: LA090012
Louisiana Environmental Certificate #: 05007
Maine Certification #: FL1264
Massachusetts Certification #: M-FL1264
Michigan Certification #: 9911
Mississippi Certification: FL NELAC Reciprocity
Montana Certification #: Cert 0074
Nevada Certification: FL NELAC Reciprocity
New Hampshire Certification #: 2958
New Jersey Certification #: FL765
New York Certification #: 11608
North Carolina Environmental Certificate #: 667
North Carolina Certification #: 12710
Pennsylvania Certification #: 68-547
Puerto Rico Certification #: FL01264
Tennessee Certification #: TN02974
Texas Certification: FL NELAC Reciprocity
Virginia Certification #: 00432
Wyoming Certification: FL NELAC Reciprocity

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SAMPLE SUMMARY

Project: Stormwater Research
Pace Project No.: 3526611

Lab ID	Sample ID	Matrix	Date Collected	Date Received
3526611001	**STE**	Water	02/17/11 15:00	02/18/11 07:15
3526611002	**UNSAT CL4**	Water	02/17/11 15:00	02/18/11 07:15
3526611003	**DENTT LS1**	Water	02/17/11 15:00	02/18/11 07:15
3526611004	**DENTT SU1**	Water	02/17/11 15:00	02/18/11 07:15
3526611005	**INSITU1**	Water	02/17/11 15:00	02/18/11 07:15
3526611006	**INSITU3**	Water	02/17/11 15:00	02/18/11 07:15

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(386)672-5668

SAMPLE ANALYTE COUNT

Project: Stormwater Research
Pace Project No.: 3526611

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
3526611001	**STE**	EPA 8011	KMH	2	PASI-O
3526611002	**UNSAT CL4**	EPA 8011	KMH	2	PASI-O
3526611003	**DENTT LS1**	EPA 8011	KMH	2	PASI-O
3526611004	**DENTT SU1**	EPA 8011	KMH	2	PASI-O
3526611005	**INSITU1**	EPA 8011	KMH	2	PASI-O
3526611006	**INSITU3**	EPA 8011	KMH	2	PASI-O

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PROJECT NARRATIVE

Project: Stormwater Research
Pace Project No.: 3526611

Method: **EPA 8011**
Description: 8011 GCS EDB and DBCP
Client: Applied Environmental Technology*
Date: February 24, 2011

General Information:
6 samples were analyzed for EPA 8011. All samples were received in acceptable condition with any exceptions noted below.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:
The samples were prepared in accordance with EPA 8011 with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Surrogates:
All surrogates were within QC limits with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:
All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

This data package has been reviewed for quality and completeness and is approved for release.

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ANALYTICAL RESULTS

Project: Stormwater Research
Pace Project No.: 3526611

Sample: STE **Lab ID: 3526611001** Collected: 02/17/11 15:00 Received: 02/18/11 07:15 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8011 GCS EDB and DBCP	Analytical Method: EPA 8011 Preparation Method: EPA 8011								
1,2-Dibromo-3-chloropropane	**0.012 I**	ug/L	0.020	0.0049	1	02/21/11 11:00	02/22/11 05:52	96-12-8	
1,2-Dibromoethane (EDB)	**0.0062U**	ug/L	0.010	0.0062	1	02/21/11 11:00	02/22/11 05:52	106-93-4	

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ANALYTICAL RESULTS

Project: Stormwater Research
Pace Project No.: 3526611

Sample: UNSAT CL4 **Lab ID: 3526611002** Collected: 02/17/11 15:00 Received: 02/18/11 07:15 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8011 GCS EDB and DBCP	Analytical Method: EPA 8011 Preparation Method: EPA 8011								
1,2-Dibromo-3-chloropropane	**0.0048U**	ug/L	0.020	0.0048	1	02/21/11 11:00	02/22/11 06:06	96-12-8	
1,2-Dibromoethane (EDB)	**0.0061U**	ug/L	0.0099	0.0061	1	02/21/11 11:00	02/22/11 06:06	106-93-4	

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ANALYTICAL RESULTS

Project: Stormwater Research
Pace Project No.: 3526611

Sample: DENTT LS1 **Lab ID: 3526611003** Collected: 02/17/11 15:00 Received: 02/18/11 07:15 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8011 GCS EDB and DBCP	Analytical Method: EPA 8011 Preparation Method: EPA 8011								
1,2-Dibromo-3-chloropropane	**0.0050U**	ug/L	0.020	0.0050	1	02/21/11 11:00	02/22/11 06:21	96-12-8	
1,2-Dibromoethane (EDB)	**0.0063U**	ug/L	0.010	0.0063	1	02/21/11 11:00	02/22/11 06:21	106-93-4	

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ANALYTICAL RESULTS

Project: Stormwater Research
Pace Project No.: 3526611

Sample: DENTT SU1 **Lab ID: 3526611004** Collected: 02/17/11 15:00 Received: 02/18/11 07:15 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8011 GCS EDB and DBCP	Analytical Method: EPA 8011 Preparation Method: EPA 8011								
1,2-Dibromo-3-chloropropane	**0.0050U**	ug/L	0.020	0.0050	1	02/21/11 11:00	02/22/11 06:36	96-12-8	
1,2-Dibromoethane (EDB)	**0.0063U**	ug/L	0.010	0.0063	1	02/21/11 11:00	02/22/11 06:36	106-93-4	

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ANALYTICAL RESULTS

Project: Stormwater Research
Pace Project No.: 3526611

Sample: INSITU1 **Lab ID: 3526611005** Collected: 02/17/11 15:00 Received: 02/18/11 07:15 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8011 GCS EDB and DBCP	Analytical Method: EPA 8011 Preparation Method: EPA 8011								
1,2-Dibromo-3-chloropropane	**0.0048U**	ug/L	0.020	0.0048	1	02/21/11 11:00	02/22/11 06:51	96-12-8	
1,2-Dibromoethane (EDB)	**0.0061U**	ug/L	0.0098	0.0061	1	02/21/11 11:00	02/22/11 06:51	106-93-4	

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ANALYTICAL RESULTS

Project: Stormwater Research
Pace Project No.: 3526611

Sample: INSITU3 **Lab ID: 3526611006** Collected: 02/17/11 15:00 Received: 02/18/11 07:15 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8011 GCS EDB and DBCP	Analytical Method: EPA 8011 Preparation Method: EPA 8011								
1,2-Dibromo-3-chloropropane	**0.0050U**	ug/L	0.020	0.0050	1	02/21/11 11:00	02/22/11 07:20	96-12-8	
1,2-Dibromoethane (EDB)	**0.0063U**	ug/L	0.010	0.0063	1	02/21/11 11:00	02/22/11 07:20	106-93-4	

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QUALITY CONTROL DATA

Project: Stormwater Research
Pace Project No.: 3526611

QC Batch: OEXT/4161 Analysis Method: EPA 8011
QC Batch Method: EPA 8011 Analysis Description: 8011 EDB DBCP
Associated Lab Samples: 3526611001, 3526611002, 3526611003, 3526611004, 3526611005, 3526611006

METHOD BLANK: 173178 Matrix: Water
Associated Lab Samples: 3526611001, 3526611002, 3526611003, 3526611004, 3526611005, 3526611006

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
1,2-Dibromo-3-chloropropane	ug/L	0.0049U	0.020	02/22/11 01:56	
1,2-Dibromoethane (EDB)	ug/L	0.0062U	0.010	02/22/11 01:56	

LABORATORY CONTROL SAMPLE: 173179

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
1,2-Dibromo-3-chloropropane	ug/L	.25	0.25	102	60-140	
1,2-Dibromoethane (EDB)	ug/L	.25	0.25	101	60-140	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 173834 173835

Parameter	Units	3525802011 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
1,2-Dibromo-3-chloropropane	ug/L	0.0049 U	.44	.44	0.45	0.45	103	104	60-140	.3	40	
1,2-Dibromoethane (EDB)	ug/L	0.0062 U	.44	.44	0.47	0.47	108	108	60-140	.03	40	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, Inc.
8 East Tower Circle
Ormond Beach, FL 32174
(386)672-5668

QUALIFIERS

Project: Stormwater Research
Pace Project No.: 3526611

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to changes in sample preparation, dilution of the sample aliquot, or moisture content.

ND - Not Detected at or above adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

S - Surrogate

1,2-Diphenylhydrazine (8270 listed analyte) decomposes to Azobenzene.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is NELAP accredited. Contact your Pace PM for the current list of accredited analytes.

LABORATORIES

PASI-O	Pace Analytical Services - Ormond Beach

ANALYTE QUALIFIERS

I	The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit.

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Ormond Beach, FL 32174
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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: Stormwater Research
Pace Project No.: 3526611

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
3526611001	**STE**	EPA 8011	OEXT/4161	EPA 8011	GCSV/3173
3526611002	**UNSAT CL4**	EPA 8011	OEXT/4161	EPA 8011	GCSV/3173
3526611003	**DENTT LS1**	EPA 8011	OEXT/4161	EPA 8011	GCSV/3173
3526611004	**DENTT SU1**	EPA 8011	OEXT/4161	EPA 8011	GCSV/3173
3526611005	**INSITU1**	EPA 8011	OEXT/4161	EPA 8011	GCSV/3173
3526611006	**INSITU3**	EPA 8011	OEXT/4161	EPA 8011	GCSV/3173

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www.pacelabs.com

CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

3526611

Page: of

1456016

Section A Required Client Information:

Company: AET
Address: 10809 Cedar Cove Dr
Tampa FL 33592
Email To: dpsmith_aet@verizon.net
Phone: 813 285 9908 Fax: 248 6783843
Requested Due Date/TAT:

Section B Required Project Information:

Report To: Daniel Smith
Copy To:
Purchase Order No.:
Project Name:
Project Number:

Section C Invoice Information:

Attention:
Company Name:
Address:
Pace Quote Reference:
Pace Project Manager:
Pace Profile #:

REGULATORY AGENCY

☐ NPDES ☐ GROUND WATER ☐ DRINKING WATER
☐ UST ☐ RCRA ☐ OTHER

Site Location STATE:

Section D Required Client Information

SAMPLE ID
(A-Z, 0-9 / ,-)
Sample IDs MUST BE UNIQUE

Matrix Codes MATRIX / CODE

Drinking Water	DW
Water	WT
Waste Water	WW
Product	P
Soil/Solid	SL
Oil	OL
Wipe	WP
Air	AR
Tissue	TS
Other	OT

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED COMPOSITE START DATE	COLLECTED COMPOSITE START TIME	COLLECTED COMPOSITE END/GRAB DATE	COLLECTED COMPOSITE END/GRAB TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Y/N	Analysis Test	Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
1	STE																		8260/8111		
2	UNSAT CL 4																				
3	DENIT LS 1	WW	G	2/17/11	3pm																
4	DENIT SU 1																				
5	INSITU 1																				
6	INSITU 3																				
7																					
8																					
9																					
10																					
11																					
12																					

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS
	Daniel Smith			Kristin Clowes Pace	2/17/11	16:23	
	BTivestreak	2/17/11	1800	K-Hayden	2/18/11	0750	0.2 Y

ORIGINAL

SAMPLER NAME AND SIGNATURE: T39
PRINT Name of SAMPLER:
SIGNATURE of SAMPLER: DATE Signed (MM/DD/YY):

Temp in °C | Received on Ice (Y/N) | Custody Sealed Cooler (Y/N) | Samples Intact (Y/N)

*Important Note: By signing this form you are accepting Pace's NET 30 day payment terms and agreeing to late charges of 1.5% per month for any invoices not paid within 30 days.

APPENDIX F

Acute Toxicity Bioassay Report

MARINCO BIOASSAY LABORATORY
The Aquatic Toxicology Specialists

Whole Effluent Toxicity Testing Summary Page

Client name: Applied Environmental Technology

MBL Project/Report # 110226

MBL Sample #	Species	Permit Requirements	Test Results	Passing or Failure
110226-2	*Cyprinella leedsi*	LC50 > / = 100%	LC50 > 100%	Passing
110226-3	*Cyprinella leedsi*	LC50 > / = 100%	LC50 > 100%	Passing
110226-4	*Cyprinella leedsi*	LC50 > / = 100%	LC50 > 100%	Passing
110226-5	*Cyprinella leedsi*	LC50 > / = 100%	LC50 = 15.6%	Failure
110226-6	*Cyprinella leedsi*	LC50 > / = 100%	LC50 > 100%	Passing
----------	----------	----------	----------	----------
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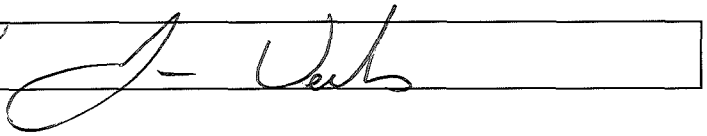
Additional Testing Required: No

Comments:

QA/QC Officer/Reviewer: Signature 

Date: 2/28/11

Effluent Toxicity Testing Report Form

All blanks on this form are to be filled in. Blanks that are not should be filled in with "N/A" or a line drawn through the blank. Please print.

ATTACHMENTS: Please attach the following items to this report form and indicate with an "X" in box.

1. All Chain-of-Custody Forms	X
2. Standard Reference Toxicant (SRT) Reports attached. 1 SRT Reports attached.	X
3. All Raw Data (Bench Sheets) Pertaining to the Tests (i.e., all physical, chemical and biological measurements)	X
4. All Result Calculations	X

Facility/ Industry/ Client Name and address: **Applied Environmental Technology, 10809 Cedar Cove Drive, Tampa, FL 33592-2250**

NPDES Number: N/A County: N/A

Non-NPDES (1) N/A Yes Project N/A

Name, Address, & Phone Number of Consultant Company: **Marinco Bioassay Laboratory, Inc. (MBL), 4569 Samuel Street Sarasota, Florida 34233, (941) 925-3594, Certification #E84191, Contact: Jason Weeks Laboratory Director**

Dates Test(s) Conducted:

Start Date: 02/18/2011 Start Time: 1605 hrs.

End Date: 02/22/2011

Name(s) of Person(s) Conducting Test(s):(Printed): **Dubravka Mihajlovic, Smiljana Kerkez, Marlena Beck, Sutanya Singivipulya, and Ivory Crofoot**

QA/QC Officer/Reviewer: Signature: [signature] Date: 2/28/11

Laboratory Report #/ Project #: 110226

Sampler's Name: (Print): **Daniel P. Smith**

Routine Test X Additional N/A For failed routine test dated: N/A

Samples

#	Date and Time Collected	Lab Sample #	Sample Type: Grab or Composite	Arrival Temp oC	Initial Residual Chlorine (mg/L)	Lab Dechlorination	Chemical Used
2	02/17/2011 1500 hrs (Unsat 4)	110226-2	Grab	1	-------	------	-------
3	02/17/2011 1500 hrs (Denit LS1)	110226-3	Grab	1	-------	------	-------
4	02/17/2011 1500 hrs (Denit SU1)	110226-4	Grab	1	-------	------	-------
5	02/17/2011 1500 hrs (InSitu 1)	110226-5	Grab	1	-------	------	-------
6	02/17/2011 1500 hrs (InSitu 3)	110226-6	Grab	1	-------	------	-------
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--	----------	----------	----------	---	-------	------	-------
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Type of Refrigerant Used for Sample Transportation: X Wet Ice N/A Blue Ice N/A Other

Sample Delivered By: N/A Bus X Hand N/A Common Carrier

Samples Aerated: Yes, to adjust D.O. levels. Yes (Describe) N/A No

Samples Filtered: N/A Yes (Describe) X No

Provide Description: N/A

(1) If toxicity testing data are reported for any project other than permit compliance testing, mark "yes" and identify the reason that toxicity data are being submitted, e.g., Consent Order, ambient monitoring, mixing zone evaluation.

This Page Last Edited By: Marlena Beck on: 02/23/2011

Summary of Test Conditions

Type of Test (1)	Test Conc. (%)	Age of Test Organism	Test Species Used (3)	Amount & Type Food	How Often Fed	Test Chamber Volume	Volume of Effluent Used	Type of Chamber	# of Organism/ Chamber	# of Replicates	Temp Range (Degrees Celsius)
D	0, 6.25, 12.5, 25, 50, 100	12 days	CL	0.04 mL of 1200 Artemia nauplii/0.1 mL per replicate	Once at renewal	1000 mL	250 mL	Beaker	10	2	24
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-	----------	------	--	----------	----------	------	------	----------	------	--	-----

G. Other: N/A

Temperature Readings Were: N/A Single | N/A Multiple | X Continuous

Description of Control Water: Synthetic Moderately Hard (Reconstituted)

Photoperiod During Test: 16 Hrs. Light : 8 Hrs. Dark

Reference Toxicant Data (4)

Name of Toxicant	Dates of Test Begin and End	Species (3)	In-House or Commercially Obtained	LC50/IC25
NaCl	02/02/2011-02/06/2011	CL	In-House	5.64 g/L NaCl
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(1) Please fill the "Type of Test" Box with the Appropriate Letter:
- **A.** 48-Hr/Non-Renewal/Single Concentration (Screen)
- **B.** 48-Hr/Non-Renewal/Multi-Concentration (Definitive)
- **C.** 96-Hr/Renewed Every 48-Hrs/Single Concentration (Screen)
- **D.** 96-Hr/Renewed Every 48-Hrs/Multi-Concentration (Definitive)
- **E.** 7-Day Chronic/Single Concentration (Screen)/Renewed Daily
- **F.** 7-Day Chronic/Multi-Concentration (Definitive)/Renewed Daily
- **G.** Other - Describe in the "G" Box

(2) List all concentrations of effluent used (i.e., 0%, 6.25%, 12.5%, 25%, 50%, 100%)

(3) Write Appropriate Letters for the following species in this column:
- CD Ceriodaphnia dubia
- FM Pimephales promelas (fathead minnow)
- SS Menidia beryllina (inland silverside)
- MS Mysidopsis bahia (mysid shrimp)
- DP Daphnia pulex
- DM Daphnia magna
- CL Cyprinella leedsi (bannerfin shiner)
- Other - Please Describe _____

(4) Attach all reference toxicant raw data and control charts for each organism/reference toxicant used for the test.

QA/QC Officer/Reviewer: Signature

Date: 2/28/11

ACUTE Test Results.
Test conducted in accordance with EPA-821-R-02-012.

Test Species	Test Concentration (%)	Sample # (3) & Sample I.D.	% Mortality 24 Hrs (4)	% Mortality 48 Hrs (4)	% Mortality 96 Hrs (4)	LC50 (5)
CL-Control	0	----------	-----	-----	0	------
CL	6.25, 12.5, 25, 50, 100	110226-2	-----	-----	-------	>100%*
CL	6.25, 12.5, 25, 50, 100	110226-3	-----	-----	-------	>100%*
CL	6.25, 12.5, 25, 50, 100	110226-4	-----	-----	-------	>100%*
CL	6.25, 12.5, 25, 50, 100	110226-5	-----	-----	-------	15.6%
CL	6.25, 12.5, 25, 50, 100	110226-6	-----	-----	-------	> 100% *
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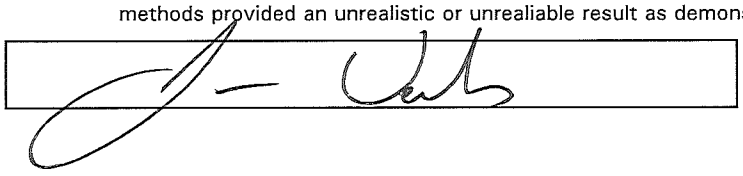
(1) List % control mortality in appropriate column (48 or 96 hr.) for organisms (use abbreviations shown on footnote 3, Page 2) that you list under the word "Control."
(2) List all concentrations of effluent used (i.e., 0%, 6.25%, 12.5%, 25%, 50%, 100%).
(3) Record number that corresponds with the number of the sample in the "Date and Time Collected" column in sample section on Page 1.
(4) List % Mortality for each organism and control if you are conducting a single concentration (Screen) test.

Species	LC50 (6)
--	----
--	----
--	----
--	----

(5) If multi-concentration (Definitive) tests are conducted on grab or composite samples, record the calculated LC50 in this column for each sample. Enter "N/A" in all % Mortality columns and LC50 box at bottom of this table.
(6) If a single concentration (Screen) test is conducted and >50% mortality occurs in any one of the four grab or composites, record <100% in this box. If <=50% mortality occurs in all four grabs or composites, record >100% in this box. Draw a line through the LC50 column in above table.
F = Flagged data, see page 5.
* No statistical test was used in endpoint determination as the data either did not appropriately fit the requirements of any point estimate techniques presented in EPA/600/4-90/027F or these methods provided an unrealistic or unrealiable result as demonstrated herein.

QA/QC Officer/Reviewer: Signature 

Date: 2/28/11

Specify if samples DO NOT meet NELAC standards:	
Standard violation	Yes/No
Improper container	No
36-hour holding time exceeded	No
Temperature above 6 degrees Celsius	No

Specify any deviations from, additions to, or exclusions from the test method or any non-standard conditions that may have affected the quality of the results, and include any data qualifiers.

All calculated statistical endpoints were calculated using ToxCalc version 5.0.21 - Tidepool Scientific Software.
The results contained in this report relate only to the items tested or to the samples as received by the laboratory. MBL certifies the results contained in this report meet NELAC standards.
This report shall not be reproduced except in full, without the written approval of MBL.

QA/QC Officer/Reviewer: Signature

Date: 2/28/11

SURVIVAL BENCH SHEET

Project #: 110226 **Test Start:** 2/18/11 1005

Test Organism: Cyprinella leedsi **Test End:** 2/22/11 1605

Organism Age: 12 days **Brood #:** CL 110206

Concentration %	Sample Number	Survival: Replicate A					Survival: Replicate B					A & B %
		0 Hours	24 Hours	48 Hours	72 Hours	96 Hours	0 Hours	24 Hours	48 Hours	72 Hours	96 Hours	
100	110226-2	10	10	10	10	10	10	10	10	10	10	100
50		10	10	10	10	10	10	10	10	10	10	100
25		10	10	10	10	10	10	10	10	10	10	100
12.5		10	10	10	10	10	10	10	10	10	10	100
6.25		10	10	10	10	10	10	10	10	10	10	100
Control		10	10	10	10	10	10	10	10	10	10	100
Organisms Fed By: (Initials & Time)		—	—	SS 0820	—	—	—	—	SS 0820	—	—	—
0 Hours started/checked by: 24, 72, 96 Hours counted by: 48 Hours renewed/cleaned by:		MB/SC	SS	MH	SC	MH	MB/SC	SS	MH	SC	MH	MH

Comments or Corrections: _____

Reviewed by: MB

Date: 2/23/11

ACUTE TOXICITY TEST PHYSICAL AND CHEMICAL MEASUREMENTS

EPA Method # 2000.0

Project #: 110226 **Test Start:** 2/18/11 1605

Test Organism: Cyprinella leedsi **Test End:** 2/22/11 1605

Effluent Concentration %	Sample Number	Dissolved Oxygen (mg/L) 0 Hours	24 Hours	48 Hours	72 Hours	96 Hours	pH 0 Hours	24 Hours	48 Hours	72 Hours	96 Hours
100	110226-2	8.1 ①	8.2	8.1/8.4	7.3	7.6	7.0	8.3	8.4/7.5	8.3	8.2
50.0		8.3	8.2	8.2/8.3	7.0	7.4	7.2	8.2	8.3/7.7	8.5	8.1
25.0		8.3	8.2	8.0/8.2	7.8	7.3	7.5	8.1	8.1/7.8	8.4	8.1
12.5		8.3	8.3	7.9/8.2	7.7	7.7	7.6	8.0	8.1/7.9	8.3	7.9
6.25		8.3	8.2	7.9/8.1	7.9	7.7	7.8	8.0	8.2/7.9	8.0	7.9
Control		8.2	8.0	7.5/8.2	8.0	7.6	8.0	7.9	7.9/8.3	7.9	7.9
Measured by:		MK	dc	MK/MK	SIC	SIC	MK	dc	MK/MK	SIC	SIC

Effluent Concentration %	Sample Number	Temperature (Degrees Celsius) 0 Hours	24 Hours	48 Hours	72 Hours	96 Hours	Conductivity (mS/cm) 0 Hours	24 Hours	48 Hours	72 Hours	96 Hours
100	110226-2	24	24	24/24	24	24	1.161	—	—/1.165	—	1209
50.0		24	24	24/24	24	24	0.730	—	—/0.732	—	0.761
25.0		24	24	24/24	24	24	0.516	—	—/0.516	—	0532
12.5		24	24	24/24	24	24	0.414	—	—/0.415	—	0.430
6.25		24	24	24/24	24	24	0.360	—	—/0.357	—	0370
Control		24	24	24/24	24	24	0.354	—	—/0.354	—	0314
Measured by:		MK	dc	MK/MK	SIC	SIC	MK	—	—/MK	—	SIC

Comments or corrections: ① Aeration started on all samples (2-6), all replicates, all concentrations at ~~5~~ (100) bubbles/min at 1600 on 2/18/11 MK 4/4

Reviewed by: MB

Date: 2/23/11

SURVIVAL BENCH SHEET

Project #: 110226 **Test Start:** 2/18/11 1605

Test Organism: Cyprinella leedsi **Test End:** 2/22/11 1605

Organism Age: 12 days **Brood #:** CL110206

Concentration %	Sample Number	Survival: Replicate A					Survival: Replicate B					A & B %
		0 Hours	24 Hours	48 Hours	72 Hours	96 Hours	0 Hours	24 Hours	48 Hours	72 Hours	96 Hours	
100	110226-3	10	10	10	8	4	10	10	9	9	6	50
50		10	10	10	10	8	10	10	10	10	8	80
25		10	10	9	6	6	10	10	9	9	9	75
12.5		10	10	9	8	8	10	10	9	9	9	85
6.25		10	10	10	10	10	10	10	10	9	9	95
Control		10	10	10	10	10	10	10	10	10	10	100
Organisms Fed By: (Initials & Time)		—	—	SS 0820	—	—	—	—	SS 0820	—	—	—
0 Hours started/checked by: 24, 72, 96 Hours counted by: 48 Hours renewed/cleaned by:		MB/SLC	SS	MH	SLC	MH	MB/SLC	SS	MH	SLC	MH	MH

Comments or Corrections: _____

Reviewed by: MB

Date: 2/23/11

ACUTE TOXICITY TEST PHYSICAL AND CHEMICAL MEASUREMENTS

EPA Method # 2000.0

Project #: 110226 Test Start: 2/18/11 1605

Test Organism: Cyprinella leedsi Test End: 2/22/11 1605

Effluent Concentration %	Sample Number	Dissolved Oxygen (mg/L) 0 Hours	24 Hours	48 Hours	72 Hours	96 Hours	pH 0 Hours	24 Hours	48 Hours	72 Hours	96 Hours
100	110226-3	8.0	6.7 (Cal 2/19)	7.2 / 7.7	6.0	7.0	8.3	8.5	8.5 / 7.7	8.2	8.6
50.0		8.4	7.6	7.5 / 8.1	7.0	7.0	8.3	8.2	8.4 / 7.8	8.2	8.2
25.0		8.4	7.9	7.8 / 8.2	7.0	7.0	8.3	8.2	8.3 / 7.9	7.9	8.1
12.5		8.2	7.9	7.7 / 8.1	7.7	7.0	8.2	8.1	8.1 / 7.9	7.9	7.9
6.25		8.3	7.9	7.9 / 8.1	7.8	8.0	8.0	8.0	8.1 / 7.9	8.0	8.0
Control		8.2	8.0	7.5 / 8.2	8.0	7.6	8.0	7.9	7.9 / 8.0	7.9	7.9
Measured by:		MM	dc	MM / MM	SLC	SLC	MM	dc	MM / MM	SLC	SLC

Effluent Concentration %	Sample Number	Temperature (Degrees Celsius) 0 Hours	24 Hours	48 Hours	72 Hours	96 Hours	Conductivity (mS/cm) 0 Hours	24 Hours	48 Hours	72 Hours	96 Hours
100	110226-3	24	24	24 / 24	24	24	0.984	—	— / 0.996	—	1.020
50.0		24	24	24 / 24	24	24	0.644	—	— / 0.650	—	0681
25.0		24	24	24 / 24	24	24	0.472	—	— / 0.473	—	0496
12.5		24	24	24 / 24	24	24	0.389	—	— / 0.390	—	0407
6.25		24	24	24 / 24	24	24	0.346	—	— / 0.344	—	0359
Control		24	24	24 / 24	24	24	0.304	—	— / 0.302	—	0314
Measured by:		MM	dc	MM / MM	SLC	SLC	MM	—	— / MM	—	SLC

Comments or corrections: _____

Reviewed by: MB

Date: 2/23/11

SURVIVAL BENCH SHEET

Project #: 110226 **Test Start:** 2/18/11 1605

Test Organism: Cyprinella leedsi **Test End:** 2/22/11 1605

Organism Age: 2 days **Brood #:** CL110206

Concentration %	Sample Number	Survival: Replicate A					Survival: Replicate B					A & B %
		0 Hours	24 Hours	48 Hours	72 Hours	96 Hours	0 Hours	24 Hours	48 Hours	72 Hours	96 Hours	
100	110226-4	10	10	10	10	10	10	10	10	10	10	100
50		10	10	10	10	10	10	10	10	10	10	100
25		10	10	10	10	10	10	10	10	10	10	100
12.5		10	10	9	9	9	10	10	10	10	10	95
6.25		10	10	10	10	10	10	10	10	10	10	100
Control		10	10	10	10	10	10	10	10	10	10	100
Organisms Fed By: (Initials & Time)		—	—	SS 0800	—	—	—	—	SS 0800	—	—	—
0 Hours started/checked by: 24, 72, 96 Hours counted by: 48 Hours renewed/cleaned by:		MB SLC	SS	NM	SLC	NM	MB SLC	SS	NM	SLC	NM	NM

Comments or Corrections: _____

Reviewed by: MB

Date: 2/23/11

ACUTE TOXICITY TEST PHYSICAL AND CHEMICAL MEASUREMENTS

EPA Method # 2000.0

Project #: 110236 Test Start: 2/18/11 1605

Test Organism: Cyprinella leedsi Test End: 2/22/11 1605

Effluent Concentration %	Sample Number	Dissolved Oxygen (mg/L) 0 Hours	24 Hours	48 Hours	72 Hours	96 Hours	pH 0 Hours	24 Hours	48 Hours	72 Hours	96 Hours
100	110236-4	8.2	8.3	8.1 / 7.3	8.0	7.8	8.3	8.5	8.4 / 7.3	8.4	8.4
50.0		8.3	8.2	8.1 / 8.1	7.9	7.7	8.3	8.3	8.4 / 7.6	8.2	8.0
25.0		8.3	8.0	8.1 / 8.1	7.4	7.7	8.4	8.2	8.2 / 7.7	8.1	8.0
12.5		8.2	8.1	8.2 / 8.1	7.2	7.7	8.4	8.1	8.2 / 7.8	7.9	7.9
6.25		8.2	8.0	7.2 / 8.1	7.0	6.8	8.2	8.0	7.9 / 7.9	7.7	7.7
Control		8.2	8.0	7.5 / 8.2	8.0	7.6	8.0	7.9	7.9 / 8.0	7.9	7.9
Measured by:		MY	dC	MY / MY	SK	SK	MY	dC	MY / MY	SK	SK

Effluent Concentration %	Sample Number	Temperature (Degrees Celsius) 0 Hours	24 Hours	48 Hours	72 Hours	96 Hours	Conductivity (mS/cm) 0 Hours	24 Hours	48 Hours	72 Hours	96 Hours
100	110236-4	24	24	24 / 24	24	24	1.390	—	— / 1.442	—	1.445
50.0		24	24	24 / 24	24	24	0.876	—	— / 0.896	—	0927
25.0		24	24	24 / 24	24	24	0.599	—	— / 0.606	—	0625
12.5		24	24	24 / 24	24	24	0.457	—	— / 0.459	—	0477
6.25		24	24	24 / 24	24	24	0.381	—	— / 0.381	—	0392
Control		24	24	24 / 24	24	24	0.354	—	— / 0.352	—	0314
Measured by:		MY	dC	MY / MY	SK	SK	MY	—	— / MY	—	SK

Comments or corrections: _____

Reviewed by: MB

Date: 2/23/11

Acute Fish Test-96 Hr Survival

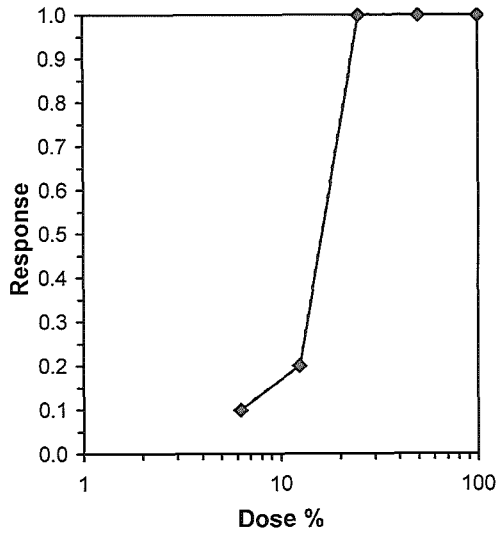
Start Date:	2/18/2011	Test ID:	110226CL	Sample ID:	110226-5
End Date:	2/22/2011	Lab ID:	MBL-Marinco Bioassay Lab.	Sample Type:	
Sample Date:		Protocol:	EPA Method #2000.0	Test Species:	CL-*Cyprinella leedsi*
Comments:	This analysis was performed by Marlena Beck at MBL.				

Conc-%	1	2
Control	1.0000	1.0000
6.25	0.9000	0.9000
12.5	0.9000	0.7000
25	0.0000	0.0000
50	0.0000	0.0000
100	0.0000	0.0000

			Transform: Untransformed					Number	Total
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	Resp	Number
Control	**1.0000**	1.0000	1.0000	1.0000	1.0000	0.000	2	0	20
6.25	**0.9000**	0.9000	0.9000	0.9000	0.9000	0.000	2	2	20
12.5	**0.8000**	0.8000	0.8000	0.7000	0.9000	17.678	2	4	20
25	**0.0000**	0.0000	0.0000	0.0000	0.0000	0.000	2	20	20
50	**0.0000**	0.0000	0.0000	0.0000	0.0000	0.000	2	20	20
100	**0.0000**	0.0000	0.0000	0.0000	0.0000	0.000	2	20	20

Trimmed Spearman-Karber

Trim Level	EC50	95% CL	
0.0%			
5.0%			
10.0%	15.608	13.241	18.396
20.0%	16.210	14.714	17.859
Auto-10.0%	**15.608**	**13.241**	**18.396**



ToxCalc v5.0

Reviewed by: SS

SURVIVAL BENCH SHEET

Project #: 110226 **Test Start:** 2/18/11 1605

Test Organism: Cyprinella leedsi **Test End:** 2/22/11 1605

Organism Age: 6 days **Brood #:** CL110206

Concentration %	Sample Number	Survival: Replicate A					Survival: Replicate B					A & B %
		0 Hours	24 Hours	48 Hours	72 Hours	96 Hours	0 Hours	24 Hours	48 Hours	72 Hours	96 Hours	
100	110226-5	10	0				10	0				0
50		10	0				10	0				0
25		10	0				10	0				0
12.5		10	9	9	9	9	10	7	7	7	7	80
6.25		10	9	9	9	9	10	10	10	10	9	90
Control		10	10	10	10	10	10	10	10	10	10	100
Organisms Fed By: (Initials & Time)		—	—	SS 0820	—	—	—	—	SS 0820	—	—	—
0 Hours started/checked by: 24, 72, 96 Hours counted by: 48 Hours renewed/cleaned by:		MB/SK	SS	MH	SK	MH	MB/SK	SS	MH	SK	MH	MH

Comments or Corrections: _____

Reviewed by: MB

Date: 2/22/11

ACUTE TOXICITY TEST PHYSICAL AND CHEMICAL MEASUREMENTS

EPA Method # 2000.0

Project #: 110226 Test Start: 2/18/11 1605

Test Organism: Cyprinella leedsi Test End: 2/22/11 1605

Effluent Concentration %	Sample Number	Dissolved Oxygen (mg/L) 0 Hours	24 Hours	48 Hours	72 Hours	96 Hours	pH 0 Hours	24 Hours	48 Hours	72 Hours	96 Hours
100	110226-5	6.0	7.9	—	—	—	8.3	8.7	—	—	—
50.0		7.8	5.8	—	—	—	8.3	8.4	—	—	—
25.0		8.1	7.4	—	—	—	8.3	8.4	—	—	—
12.5		8.1	7.8	8.1/8.2	7.9	7.6	8.3	8.2	8.3/8.2	8.1	8.1
6.25		8.1	8.0	7.9/8.1	7.9	7.9	8.2	8.1	8.2/8.1	8.1	8.0
Control		8.2	6.0	7.5/8.2	8.0	7.6	8.0	7.9	7.9/8.0	7.9	7.9
Measured by:		[illegible]	dc	[illegible]/[illegible]	SK	SK	[illegible]	dc	[illegible]/[illegible]	SK	SK

Effluent Concentration %	Sample Number	Temperature (Degrees Celsius) 0 Hours	24 Hours	48 Hours	72 Hours	96 Hours	Conductivity (mS/cm) 0 Hours	24 Hours	48 Hours	72 Hours	96 Hours
100	110226-5	24	24	—	—	—	1.385	1.187 dc 2/19	—	—	—
50.0		24	24	—	—	—	0.852	0.812 dc 2/19	—	—	—
25.0		24	24	—	—	—	0.581	0.504 dc 2/19	—	—	—
12.5		24	24	24/24	24	24	0.444	—	— / 0.442	—	0.447
6.25		24	24	24/24	24	24	0.373	—	— / 0.367	—	0.374
Control		24	24	24/24	24	24	0.314	—	— / 0.312	—	0.314
Measured by:		[illegible]	dc	[illegible]/[illegible]	SK	SK	[illegible]	dc 2/19/11	—/[illegible]	—	SK

Comments or corrections: _____

Reviewed by: MB

Date: 2/23/11

SURVIVAL BENCH SHEET

Project #: 110226 **Test Start:** 2/18/11 1605

Test Organism: Ceriodaphnia dubia **Test End:** 2/22/11 1605

Organism Age: 12 days **Brood #:** CD110206

Concentration %	Sample Number	Survival: Replicate A					Survival: Replicate B					A & B %
		0 Hours	24 Hours	48 Hours	72 Hours	96 Hours	0 Hours	24 Hours	48 Hours	72 Hours	96 Hours	
100	110226-6	10	10	10	10	10	10	10	10	10	8	90
50		10	10	9	9	9	10	10	10	10	10	95
25		10	10	10	10	10	10	10	10	10	10	100
12.5		10	10	10	10	10	10	10	10	10	10	100
6.25		10	10	10	10	10	10	10	10	10	10	100
Control		10	10	10	10	10	10	10	10	10	10	100
Organisms Fed By: (Initials & Time)		—	—	SS 0820	—	—	—	—	SS 0820	—	—	—
0 Hours started/checked by: 24, 72, 96 Hours counted by: 48 Hours renewed/cleaned by:		MB/SLC	SS	MH	SLC	MH	MB/SLC	SS	MH	SLC	MH	MH

Comments or Corrections: _____

Reviewed by: MB

Date: 2/23/11

ACUTE TOXICITY TEST PHYSICAL AND CHEMICAL MEASUREMENTS

EPA Method # 2000.0

Project #: 110236 Test Start: 2/18/11 1605

Test Organism: Cyprinella leedsi Test End: 2/22/11 1605

Effluent Concentration %	Sample Number	Dissolved Oxygen (mg/L)					pH				
		0 Hours	24 Hours	48 Hours	72 Hours	96 Hours	0 Hours	24 Hours	48 Hours	72 Hours	96 Hours
100	110236-6	8.1	7.5	7.7/7.6	7.4	7.7	8.4	~~8.8~~ 8.4	8.9/7.9	8.9	9.0
50.0		8.3	8.2	8.0/8.2	7.3	7.6	8.4	8.4	8.8/8.0	8.5	8.8
25.0		8.3	8.1	8.0/8.2	7.9	7.1	8.4	8.5	8.5/8.0	8.4	8.3
12.5		8.3	8.1	8.0/8.2	7.9	7.9	8.4	8.3	8.3/8.1	8.3	8.3
6.25		8.1	7.9	7.9/8.2	8.0	7.9	8.3	8.2	8.3/8.0	8.1	8.1
Control		8.2	8.0	7.5/8.2	8.0	7.6	8.0	7.9	7.9/8.0	7.9	7.9
Measured by:		MB	dc	MB/MB	SIC	SIC	MB	dc	MB/MB	SIC	SIC

Effluent Concentration %	Sample Number	Temperature (Degrees Celsius)					Conductivity (uS/cm)				
		0 Hours	24 Hours	48 Hours	72 Hours	96 Hours	0 Hours	24 Hours	48 Hours	72 Hours	96 Hours
100	110236-6	24	24	24/24	24	24	1.845	—	—/1.850	—	1899
50.0		24	24	24/24	24	24	1.084	—	—/1.090	—	1.131
25.0		24	24	24/24	24	24	0.700	—	—/0.699	—	0.730
12.5		24	24	24/24	24	24	0.503	—	—/0.507	—	0.528
6.25		24	24	24/24	24	24	0.402	—	—/0.406	—	0.422
Control		24	24	24/24	24	24	0.354	—	—/0.352	—	0.314
Measured by:		MB	dc	MB/MB	SIC	SIC	MB	—	—/MB	—	SIC

Comments or corrections: _____

Reviewed by: MB

Date: 2/23/11

SAMPLE/CONTROL WATER INFORMATION

Project #: 110226

Control Water and Sample Analysis

	Laboratory Number	Alkalinity (mg/L)	Date	Measured by:	Hardness (mg/L)	Date	Measured by:	Chlorine (mg/L)	Date	Measured by:	Cond. (mS/cm)*	Date	Measured by:
Initial Sample Analysis	110226-2	142	2/24/11	SC	136	2/24/11	SC				1.161	2/18/11	MB
	-3	295	2/24/11	SC	460	2/24/11	SC				0.984	2/18/11	MB
	-4	204	2/24/11	SC	446	2/24/11	SC				1.390	2/18/11	MB
	-5	503	2/24/11	SC	358	2/24/11	SC				1.385	2/18/11	MB
	-6	480	2/24/11	SC	178	2/24/11	SC				1.845	2/18/11	MB
Control Water Initial	SMH110216	56	2/24/11	SC	84	2/24/11	SC				0.324	2/18/11	MB
Control Water Renewal	SMH110216	56	2/24/11	SC	84	2/24/11	SC				0.322	2/20/11	MB
	h 2/25												

*Conductivity values indicated at a reference temperature of 25 degrees celsius. Values in this column for salt-control-water, SWyymmdd, are for salinity determined at the time of initial use in the test.

Sample Aeration

Sample #	Initial D.O. (mg/L)	Aeration Duration (min.)	Aeration Rate (ml/min.)	Final D.O. (mg/L)	Aerated by: Initials/Date/Time/Volume	Initial Sample pH	Measured by:
110226-2	8.1	N/A	N/A	N/A	MB 2/18/11 1230	6.8	MB
-3	3.0	10.0	~500	8.0	MB (1.0L)	6.8	MB
-4	0.9	"	~500	8.2	MB (1.0L)	7.0	MB
-5	0.7	"	~500	6.0	MB (1.0L)	6.8	MB
-6	5.2	"	~500	8.1	MB " (1.0L)	7.4	MB
110226-2	9.4	3	~500	8.4	MB 2/20/11 1447 (1.5L)	7.1	MB
-3	6.4	"	"	7.7	MB "	7.1	MB
-4	7.0	N/A	N/A	N/A	MB	7.3	MB
-5	2.6	3	~500	8.1	MB (1.0L)	7.1	MB
-6	6.5	"	"	7.6	MB " "	7.6	MB

Comments or corrections: _____

Reviewed by: MB

Date: 2/23/11

ACUTE TEST CONDITIONS

Project #: 110226 **Client:** Applied Environmental Technology

Test type: 96 hr. Acute - SS **Test run in Environmental Chamber #:** 2

Species Code (1)	Receipt Date and Supplier of Organism (if commercially obtained)	Init.	Amount & Type of Food (2)	Init.	How Often Fed (3)	Init.	Test Chamber Vol. (mL)	Init.	Vol. of Effluent Used (mL)	Init.	Type of Chamber (4)	Init.
AL	—	MB	E	SS	R	SS	1000	MB	250	MB	B	MB

(1) CD *Ceriodaphnia dubia*
FM *Pimephales promelas* (fathead minnow)
SS *Menidia beryllina* (inland silverside)
MS *Mysidopsis bahia* (mysid shrimp)
DP *Daphnia pulex*
DM *Daphnia magna*
CL *Cyprinella leedsi* (bannerfin shiner)
Other - Please Describe _____

(2) Please fill the "Amount & Type of Food" Box with the appropriate letter:
'AA' 0.1 mL Selenastrum per replicate, 0.1 mL YCT per replicate
'A' 0.2 mL Selenastrum per replicate, 0.2 mL YCTper replicate
'B' 1.4 mL Selenastrum/200 mL of sample, 1.4 mL YCT/200 mL of sample
'C' 0.1 mL conc. Artemia nauplii
'D' 0.085 mL of 1200 Artemia nauplii/0.1 mL per replicate
'E' 0.04 mL of 1200 Artemia nauplii/0.1 mL per replicate
'O' Other_____

(3) Please fill the "How Often Fed" box with the appropriate letter:
'R' Once, at least two hours before renewal
'D' Once daily
'T' Twice daily
'O' Other _____

(4) Please fill the "Type of Chamber" box with the appropriate letter:
'B' Plastic Beaker
'M' Plastic Medicine Cup
'P' Plastic Cup
'G' Glass Beaker
'C' Plastic Container
'O' Other _____

Photoperiod: [MB] 16 hours Light/8 hours dark
[—] Other _____

Test(s) conducted in accordance with EPA-821-R-02-012 **Randomization version:** N/A

Method number 2000.0

Physical and Chemical Measurement Equipment

Equipment type	Test start	24 hours	48 hours	72 hours	96 hours
Thermometer (A)	C	C	C/C	C	C
DO Meter (B)	4	4	4/4	4	4
pH Meter (C)	7	7	7/7	7	7
Conductivity meter (D)	10	10	N/A / 10	N/A	10
Freshwater cond. checked by	—	—	—/—	—	—
Used by (Initials)	M	dlc	M/M	SC	SC

(A)Thermometer number is the serial number or designated number on thermometer.
(B)DO Meters: "3" Orion 830
"4" Hach Sension 6
"5" Orion 830A
"6" Orion 820
(C)pH Meters "7" Hach Sension 2
"8" Orion 290A
"9" Orion 720
(D)Conductivity "10" Orion 160
"11" Orion 126
"O" Other _____

Comments or Corrections: _____

Reviewed by: MB

Date: 2/23/11

Marinco Bioassay Laboratory
4569 Samuel Street · Sarasota, FL 34233 · Phone: (941) 925-3594 · Fax: (941) 922-3874

Chain of Custody Record

Please use black ink only

Client: Applied Environmental Technology Permit #: N/A

Samplers (Print Names): Daniel P Smith 813 2839908
240 6783843

Sample Containers

1 qt.	2 qt.	1 Gal.
	5	

Sample Cooler #: 1502

Tests Required

Acute: CL 96HR DEF
Chronic:

Client Provided Information | **Lab Use Only**

TRC	Location	Sample ID#	Date of Sampling	Time of Sampling	Grab or Composite	Number of Bottles	Sample on Ice?	MBL Number (lab use only)	Arrival Temp.
	Unsat CL4	2	2/17/11	3pm	G	1	Y	110336-2	1°C
	Denit LS1	3	"	"	"	1	"	3	1°C
	Denit SU1	4	"	"	"	1	"	4	1°C
	In Situ 1	5	"	"	"	1	"	5	1°C
	In Situ 3	6	"	"	"	1	"	6	1°C

Sampling Kit Transfers

Relinquished By:	Received By:	Date	Time	Count
MBL: [signature]	Carrier: Hand Delivered	2/15/11	1356	5
Carrier: Hand Delivered	Client: Daniel Smith	2/15/11	1356	5

Please refer to the back of this page for instructions and examples.

Sample Transfers

Relinquished By:	Received By:	Date	Time	Count
Person's Name: Daniel Smith Facility Name: AET	Person's Name: [signature] Facility Name: MBL	2/17/11	1525	5
Person's Name: [signature] Facility Name: MBL	Person's Name: [signature] Facility Name: MBL	2/17/11	1530	5
Person's Name: Facility Name:	Person's Name: Facility Name:			
Person's Name: Facility Name:	Person's Name: Facility Name:			
Person's Name: Facility Name:	Person's Name: Facility Name:			

Shipped via : Hand Busbill/Airbill #: N/A

INTERNAL CHAIN OF CUSTODY
MARINCO BIOASSAY LABORATORY, INC.

Acute Toxicity Test

Project # 110226

Sample expiration date/time 2/14/11 0800

Sample #(s)	110226-(2-6)	110226-(2-6)
Procedure	Test Start	Test Renewal
Sample(s) checked in by Initials/Date/Time	MB 2/17/11 1530	N/A
Sample(s) warmed by Initials/Date/Time	MB 2/18/11 1405	AM 2/20/11 1430
Total Residual Chlorine measured by Initials/Date/Time	N/A	N/A
Sample(s) salted to test salinity using HW Marinemix by: Initials/Date/Time	N/A	N/A
Dilutions prepared by: Initials/Date/Time	MB 2/18/11 1511	AM 2/20/11 1510
Test Start-test started by: Test renewal-test renewed by: Initials/Date/Time	MB 2/18/11 1605	AM 2/20/11 1600
Remaining sample(s) returned to refrigerator by: Initials/Date/Time	MB 2/18/11 1511	N/A
Samples disposed of by & disposal method Initials/Date/Time	N/A	Samples Observed in test AM 2/20/11 1510

All samples are stored in the laboratory refrigerator from just above freezing to 6 degrees Celsius unless noted on this Internal chain of custody.

Comments: _____

Reviewed by: MB Date: 2/23/11